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AIR RESOURCES BRANCH
ONTARIO MINISTRY OF THE ENVIRONMENT

JUNE 1991

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PREFACE

This is the second version of the **Fast Reference Emission Document** (**FRED V2**). The report is compiled by the Emission Inventory Task Group, Air Quality and Meteorology (AQM) section of the Air Resources Branch for the internal use of the Ministry of the Environment and related users. The group welcomes any comment and suggestion on the data presented in this report. For further information please contact **S. K. Wong** , (416) 235 5774 or **D. Yap**, (416) 235 5773 of the AQM section, Air Resources Branch.

Simon S K Wong

Air Quality and Meteorology Section
Air Resources Branch
125 Resources Road, East Wing
Rexdale, Ontario
M9W 5L1

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GENERAL

The Fast Reference Emission Document (FRED) is a compilation of data designed to provide a quick but comprehensive look at emissions of the main pollutants inventoried by various sources. It is to be noted that the data given in FRED are meant for MOE internal use only and some of the contents are tentative, not final information. FRED consists of four consecutive sections A, B, C and D for Ontario, Canada, the United States and North America, respectively. The data in each section are grouped under the subsections of historical trend, annual emissions, major sources and other emissions.

Due to limited availability and reliability of current emission data, emphasis is placed on SO2 and NOx emissions and on the two base years, 1980 and 1985. Complementary tables for VOC, CO and particulates are added for the base years only. Since emission data will be continually improved and revised by better inventory methodologies and/or more realistic data, a regular schedule of six months is planned to update the FRED tables. This report is the second version of FRED, which presents the latest emissions data obtained by the emission inventory group as of July 1990. Another feature of this version is that all emission tables are accompanied by illustrative charts.

FRED information was derived from different sources. Ontario data were extracted from MOE inventories and reporting systems while reported and other tentative emissions provided by C&P were used for other provinces of Canada. Data from NAPAP tapes (Version 5 for 1980) and several EPA official reports (for 1985 and historical trends) were combined to obtain the US emissions. Details of the source references are given at the footnotes of each table.

Raw data for the compilation of Ontario inventories were obtained from Statistics Canada and several other public agencies. This information usually is available after a time lag of one to two years. As a result, the information for the most recent period, 1988 to 1989, is strictly tentative. FRED V2 was updated with better estimates for VOC, NOx and CO through the use of Mobile 4C model as well as the results of more recent studies on VOC emissions. Furthermore, the data obtained from MOE surveys of the potential industrial sources for 1986 and 1987 have been processed and included in the tables of the Ontario section. Of the most important SO2 sources, FRED V2 reports emissions up to 1989 for Ontario Hydro stations, Inco, Falconbridge and Algoma (wawa).

While every effort was made to eliminate errors and verify the data represented in FRED, it still should be used with care and the references kept in mind. The emission inventory task group will keep FRED regularly updated and expanded with the most recent emission data where applicable.

REVISION AND UPDATES IN FRED V2 (COMPARED WITH FRED V1)

SECTION A: ONTARIO EMISSIONS

- 1986, 1987 point source emissions were revised by the results of MOE 1986, 1987 surveys. All five pollutants were updated.

- Vehicle emissions (NOx, VOC and CO) were re-estimated by Mobile 4C factors for 1980 to 1988.

- VOC revised estimates from general solvent use, evaporation, chemicals and plastics industries were updated.

- Recent information on control equipment were used to revise CO, VOC and particulate estimates for earlier years (1980 to 1984).

- 1988 data (all five pollutants) were added.

- New top SO_2, NOx sources for 1987 were added.

- 1988 Ontario CO_2 emission estimates were added.

The effect of these updates and revisions is summarized in the following table. It can be noted that the changes in SO_2 emissions are negligible. Vehicle emissions of NOx, VOC and CO estimated by Mobile 4C factors are reduced from ten to twenty percent, which contributes to the overall reduction provincial total of NOx and CO. For VOC, the decrease by vehicles is more than made up by the increase of the revised emissions from solvent usage and other miscellaneous area sources. The industrial surveys for 1986, 1987 provided more realistic process data. The application of these data in calculations showed significant reductions in VOC and CO estimates for industrial point sources, which had been based on theoretical capacity of a number of plastic and chemical plants in earlier calculations presented in FRED version 1.

SECTION B: CANADA EMISSIONS

- 1985 VOC & NOx emissions revised by C&P for other provinces were updated. The changes in percentage are given in the following table.

SECTION C: UNITED STATES EMISSIONS

- Latest information on emission trends reported by EPA (up to 1988) was updated

- VOC, CO and Particulate trend data were added.

- 1985 statewise emissions were updated/ added by estimates from the latest official NAPAP reports.

PERCENT OF EMISSION VARIATIONS
BETWEEN FRED VERSION 2 AND 1 DUE TO REVISION AND UPDATES

SECTION	SECTOR	YEAR	SO2	NOx	VOC	PART	CO
ONTARIO	ONTARIO TOTAL	1985	0.0%	-4.7%	0.8%	-3.6%	-16.9%
		1986	0.6%	-4.0%	4.1%	-4.7%	-12.4%
		1987	0.5%	-4.0%	4.0%	6.1%	-13.3%
	POINT SOURCES	1985	-0.0%	0.2%	-31.6%	-3.0%	-24.7%
		1986	0.5%	4.0%	-25.1%	-3.2%	-21.9%
		1987	0.5%	4.1%	-24.3%	-3.1%	-23.7%
	AREA SOURCES	1985	0.3%	-6.8%	6.0%	-4.1%	-15.5%
		1986	2.3%	-7.0%	8.5%	6.5%	-10.9%
		1987	1.9%	-7.3%	8.3%	9.6%	-11.6%
	VEHICLES	1985	0.1%	-9.3%	-15.3%	0.1%	-18.7%
		1986	0.2%	-9.4%	-15.2%	-0.1%	-18.8%
		1987	0.1%	-9.3%	-15.3%	0.1%	-18.8%
CANADA	MANITOBA	1985	0.0%	-3.3%	5.0%	-26.5%	0.0%
	NEW BRUNSWICK	1985	0.0%	0.2%	-1.4%	-4.2%	0.0%
	NEWFOUNDLAND	1985	0.0%	-4.1%	0.3%	-0.6%	0.0%
	NOVA SCOTIA	1985	0.0%	-4.3%	-2.7%	-2.0%	0.0%
	ONTARIO	1985	-0.0%	-4.7%	0.8%	-3.6%	-16.9%
	P.E.ISLAND	1985	0.0%	-6.6%	-0.3%	-20.1%	0.0%
	QUEBEC	1985	0.0%	-7.1%	3.6%	-4.2%	0.0%
	EASTERN TOTAL	1985	0.0%	-4.9%	1.6%	-5.4%	-8.3%
	ALBERTA	1985	0.0%	-1.6%	0.7%	-13.1%	0.0%
	BRITISH COLUMBI	1985	-0.9%	-4.0%	2.0%	-2.2%	0.0%
	NW TERR./YUKON	1985	0.0%	-1.1%	0.7%	-0.0%	0.0%
	SASKATCHEWAN	1985	0.0%	-1.7%	5.0%	-27.1%	0.0%
	WESTERN TOTAL	1985	-0.1%	-2.3%	1.9%	-10.4%	0.0%
	CANADA TOTAL	1985	-0.0%	-3.7%	1.7%	-7.9%	-4.9%

SUMMARY LIST OF EMISSION TABLES FOR FAST REFERENCE

SECTION	COUNTRY PROVINCE	TABLE NUMBER	DESCRIPTION	CURRENT STATUS		SOURCES & REFERENCE	LATEST UPDATE
				Year	Pollutant		
A	ONTARIO	A 1/SO2	Trend-Major SO2 Sources & Province Totals	80-89	SO2	- MOE	August 90
		A 1/SO2HY	Ontario Hydro SO2 Trend	80-89	SO2	- MOE (from Ont. Hydro Reports)	August 90
		A.1/NOXHY	Ontario Hydro NOx Trend	80-89	NOx	- MOE (from Ont. Hydro Reports)	August 90
		A.2/85	Annual Emissions by Major Sector	1985	5 Major pollutants	- MOE	August 90
		A 2/86		1986		- MOE, tentative	August 90
		A.2/87		1987		- MOE, tentative	August 90
		A.2/88		1988		- MOE, tentative	August 90
		A.3/SO2/85	Major SO2 Sources (10)	1985	SO2	- MOE	August 90
		A.3/SO2/87	Major SO2 Sources (10)	1987	SO2	- MOE	August 90
		A.3/NOX/88	Major NOX Sources (10)	1985	NOx	- MOE	August 90
		A.3/NOX/87	Major NOx Sources (10)	1987	NOx	- MOE	August 90
		A.4/CO2/88	CO2 by sector	1988	CO2	- Ministry of Energy	Feb. 90
		A.4/ALK/85	Ammonia, Alkaline Dust	1985	NH3, Alkal.	- MOE (EAG report)	August 89
B	CANADA	B.1/SO2	Emission Trend by Region & Province	70-85	SO2	- C & P, MOE	August 90
		B.1/NOx		70-85	NOx	- C & P, MOE	August 90
		B.2/80	Annual Emission by Region & Province	1980	5 Major pollutants	- C & P, MOE	August 90
		B.2/85		1985		- C & P, MOE	August 90
		B.3/SO2/80	Major SO2 Sources (10)	1980	SO2	- C & P, MOE	April 89
		B.3/SO2/85	Major SO2 Sources (10)	1985	SO2	- C & P, MOE	April 89
C	UNITED STATES	C.1/SO2	Emission Trend by Region & State	80-88	SO2	- EPA reports	March 90
		C.1/NOx		80-88	NOx	- EPA reports	March 90
		C.1/VOC		80-88	VOC	- EPA reports	March 90
		C.1/PART		80-88	PART	- EPA reports	March 90
		C.1/CO		80-88	CO	- EPA reports	March 90
		C.2/SO2/80	Annual Emission, Rank by Region & State	1980	SO2	- NAPAP V.5	July 89
		C.2/NOX/80		1980	NOx	- NAPAP V.5	July 89
		C.2/VOC/80		1980	VOC	- NAPAP V.5	July 89
		C.2/PART/80		1980	PART	- NAPAP V.5	July 89
		C.2/CO/80		1980	CO	- NAPAP V.5	July 89
		C.2/SO2/85	Annual Emission, Rank by Region & State	1985	SO2	- NAPAP Report	Novem 89
		C 2/NOX/85		1985	NOx	- NAPAP Report	Novem 89
		C.2/VOC/85		1985	VOC	- NAPAP Report	Novem 89
		C.2/PART/85		1985	PART	- NAPAP Report	Novem 89
		C.2/CO/85		1985	CO	- NAPAP Report	Novem 89
		C.3/SO2/85	Major SO2 Sources (50)	1985	SO2	- NEDS, major pt. report	August 89
		C.3/NOX/85	Major NOx Sources (50)	1985	NOx	- NEDS, major pt. report	August 89

SUMMARY LIST OF EMISSION TABLES FOR FAST REFERENCE
(Continued)

SECTION	COUNTRY PROVINCE	TABLE NUMBER	DESCRIPTION	CURRENT STATUS		SOURCES & REFERENCE	LATEST UPDATE
				Year	Pollutant		
D	NORTH AMERICA	D.1/SO2	Emission Trend	70-87	SO2	- NAPAP, EPA, C & P, MOE data	August 90
		D.1/NOX	by EAST & WEST Region	70-87	NOx	- NAPAP, EPA, C & P, MOE data	August 90
		D.2/SO2/85	Annual Emission, Rank	1985	SO2	- NAPAP, C & P, MOE data	August 90
		D.2/NOX/85	by Region & State/Prov.	1985	NOx	- NAPAP, C & P, MOE data	August 90
		D.2/VOC/85		1985	VOC	- NAPAP, C & P, MOE data	August 90
		D.2/PART/85		1985	PART	- NAPAP, C & P, MOE data	August 90
		D.2/CO/85		1985	CO	- NAPAP, C & P, MOE data	August 90
		D.3/SO2/85	Major SO2 Sources (50)	1985	SO2	- NEDS major points, C & P, MOE	August 89
		D.3/SO2/80	Major SO2 Sources (50)	1980	SO2	- NAPAP V.5, C & P, MOE data.	August 89

SECTION A: ONTARIO EMISSIONS

ESTIMATED EMISSION TREND OF MAJOR SULPHUR DIOXIDE SOURCES IN ONTARIO

(1,000 METRIC TONS)

EMITTERS	TYPE	LOCATION	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
INCO	Copper & Nickel Smelter + IORP	Sudbury	812	723	328	459	683	695	635	659	658	637
FALCONBRIDGE	Nickel Smelter	Sudbury	123	114	61	79	84	74	90	72	60	67
ALGOMA STEEL	Iron Ore	Wawa	161	132	71	82	127	116	100	87	80	71
ONTARIO HYDRO	Utilities											
-Lambton		Courtright	150	154	152	171	145	118	96	105	90	89
-Nanticoke		Nanticoke	144	181	207	199	222	169	139	169	166	145
-Lakeview		Toronto	75	63	67	57	66	44	27	46	48	56
-Hearn		Toronto	16	6	7	1	0	0	0	0	0	0
-Thunder Bay		Thunder Bay	10	9	9	9	10	5	6	9	10	7
-Keith		Windsor	1	4	6	1	1	0	0	0	0	0
-Lennox		Bath	0.3	1	2	0	0	0	0	0	2	4
-Atikokan		Atikokan	0	0	0	0	0	1	2	4	5	4
		HYDRO TOTAL	396	418	450	438	444	337	270	332	321	305
Algoma Steel	Iron & Steel	Sault Ste Marrie	11	9	6	7	8	7	11	11 *	11 *	14
Stelco	Iron & Steel	Hamilton	16	10	7	7	11	7	7	7	7	7
Imperial Oil	Oil Refinery	Sarnia	23	27	25	23	25	20	22	28	28 *	28 *
Shell Oil	Oil Refinery	Sarnia	16	15	13	12	14	16	15	15	15 *	15 *
Pulp & Paper Industries			31	31	31 +	32 +	32 +	30	29	29	29 *	29 *
	Sub-Total		1,589	1,479	992	1,139	1,428	1,301	1,178	1,240	1,208	1,173
	Other sources		175	167	150	137	143	156	167	169	173	173
	PROVINCIAL TOTAL		1,764	1,646	1,142	1,276	1,571	1,457	1,345 @	1,409 @	1,381 @	1,346 @

Emission data for 1987,1988 & 1989 are preliminary estimates and not final figures.

+ Estimated Values

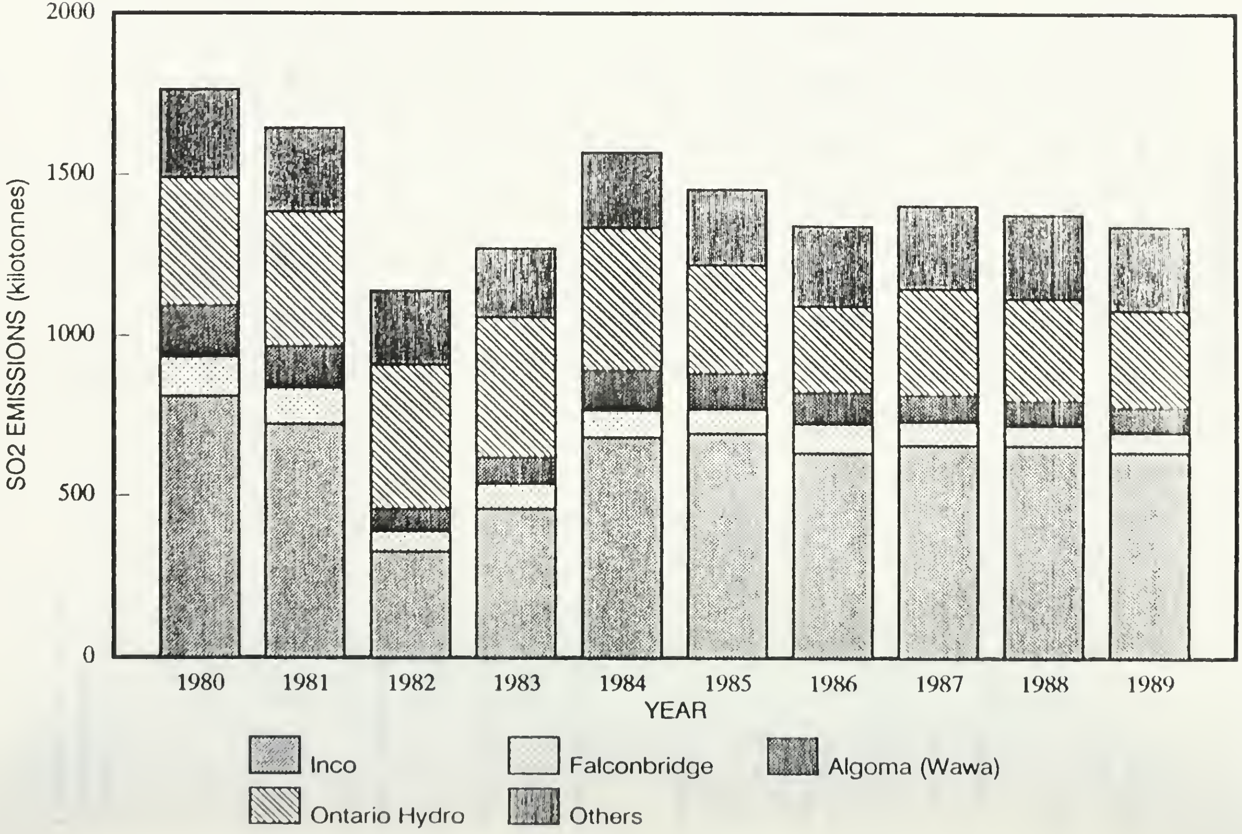
@ tentative provincial total

* not updated

MOE/ARB/AQM/E1
Aug-90

ONTARIO SO2 EMISSION TREND

1980 to 1989 – Major Sources



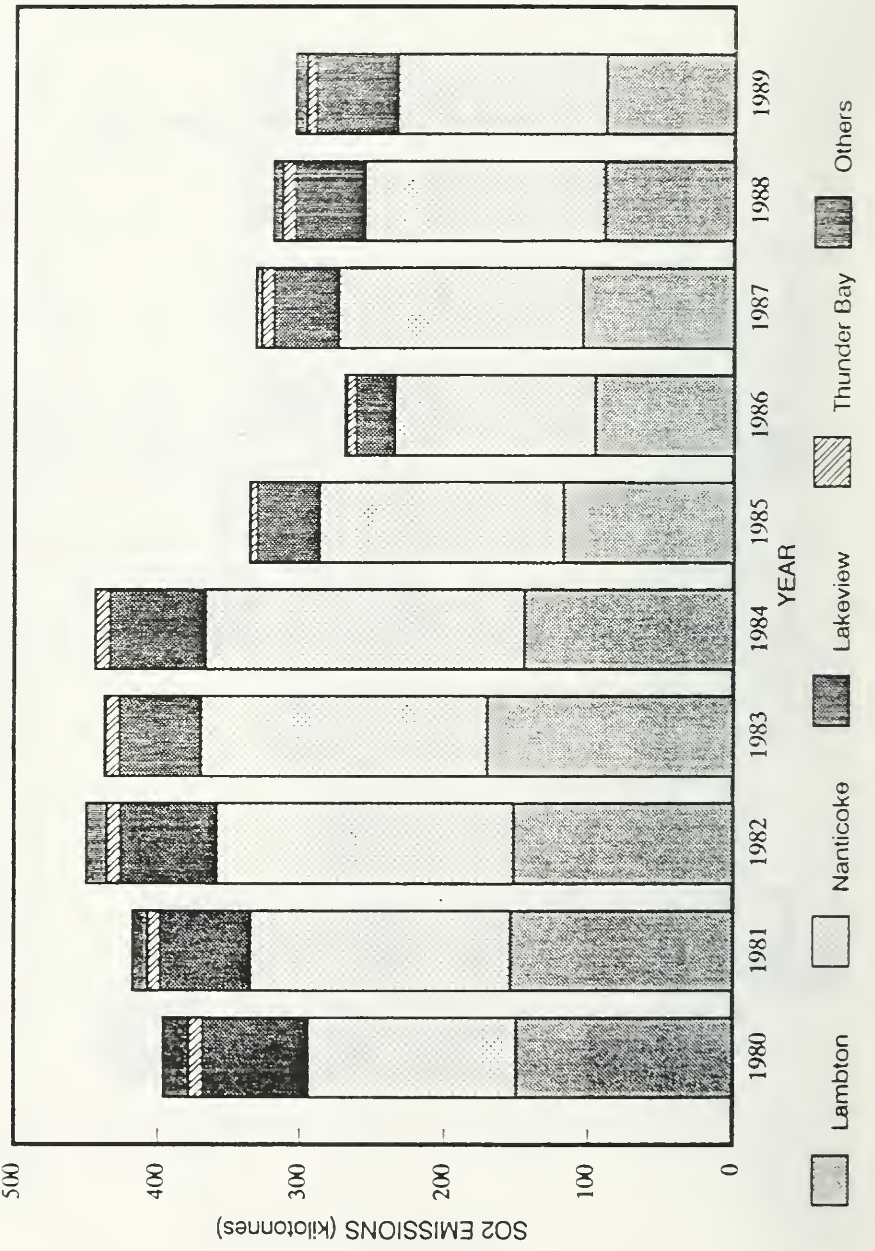
1980-1988 ONTARIO HYDRO SO2 EMISSION TREND

(Tonnes)

REGION	HYDRO STATION	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	J.C.KEITH G.S.	851	3,960	6,330	923	815	0	0	0	0	0
1	LAMBTON G.S.	149,774	154,000	152,000	171,000	145,000	118,000	96,300	105,000	90,000	89,000
2	NANTICOKE G.S.	144,001	181,000	207,000	199,000	222,000	169,000	139,000	169,000	166,000	145,000
3	LAKEVIEW G.S.	75,080	63,199	67,000	56,600	66,400	43,800	26,500	45,700	48,300	56,000
3	R.L.HEARN G.S.	16,278	5,540	6,660	529	0	0	0	0	0	0
4	LENNOX G.S.	324	1,060	1,800	0	0	0	0	107	1,510	3,700
6	ATIKOKAN G.S.	0	0	0	0	0	1,040	1,590	4,060	5,130	4,400
6	THUNDER BAY G.S.	9,727	8,740	9,420	9,420	10,000	4,740	6,290	8,540	9,570	6,700
	ONTARIO HYDRO TOTAL	396,036	417,500	450,210	437,472	444,215	336,580	269,680	332,407	320,510	304,800

Source: Ontario Hydro Reports.

MOE/ARB/AQM/EI
Aug-90



ONTARIO HYDRO SO2 EMISSION TREND
1980 to 1988 – Major Plants

1980-1988 ONTARIO HYDRO NOx EMISSION(*) TREND

(Tonnes)

REGION	HYDRO STATION	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	J.C.KEITH G.S.	215	1,058	2,142	337	307	0	0	0	0	0
1	LAMBTON G.S.	18,855	19,933	19,890	18,400	19,933	18,400	15,180	18,400	18,400	18,400
2	NANTICOKE G.S.	55,659	64,399	73,600	75,132	72,065	59,799	50,599	55,199	49,066	47,532
3	LAKEVIEW G.S.	19,775	18,396	19,890	19,933	18,400	13,646	7,973	14,260	16,866	21,466
3	R.L.HEARN G.S.	4,660	1,533	1,683	169	0	0	0	0	0	0
4	LENNOX G.S.	101	291	367	0	0	0	0	72	843	2,300
6	ATIKOKAN G.S.	0	0	0	0	0	445	767	1,687	2,760	2,453
6	THUNDER BAY G.S.	1,548	3,219	5,814	4,293	3,680	2,147	2,760	4,907	4,447	4,293
ONTARIO HYDRO TOTAL		100,813	108,829	123,386	118,263	114,385	94,437	77,279	94,525	92,382	96,444

* Note: NOx calculated as NO2

Source: Ontario Hydro Reports.

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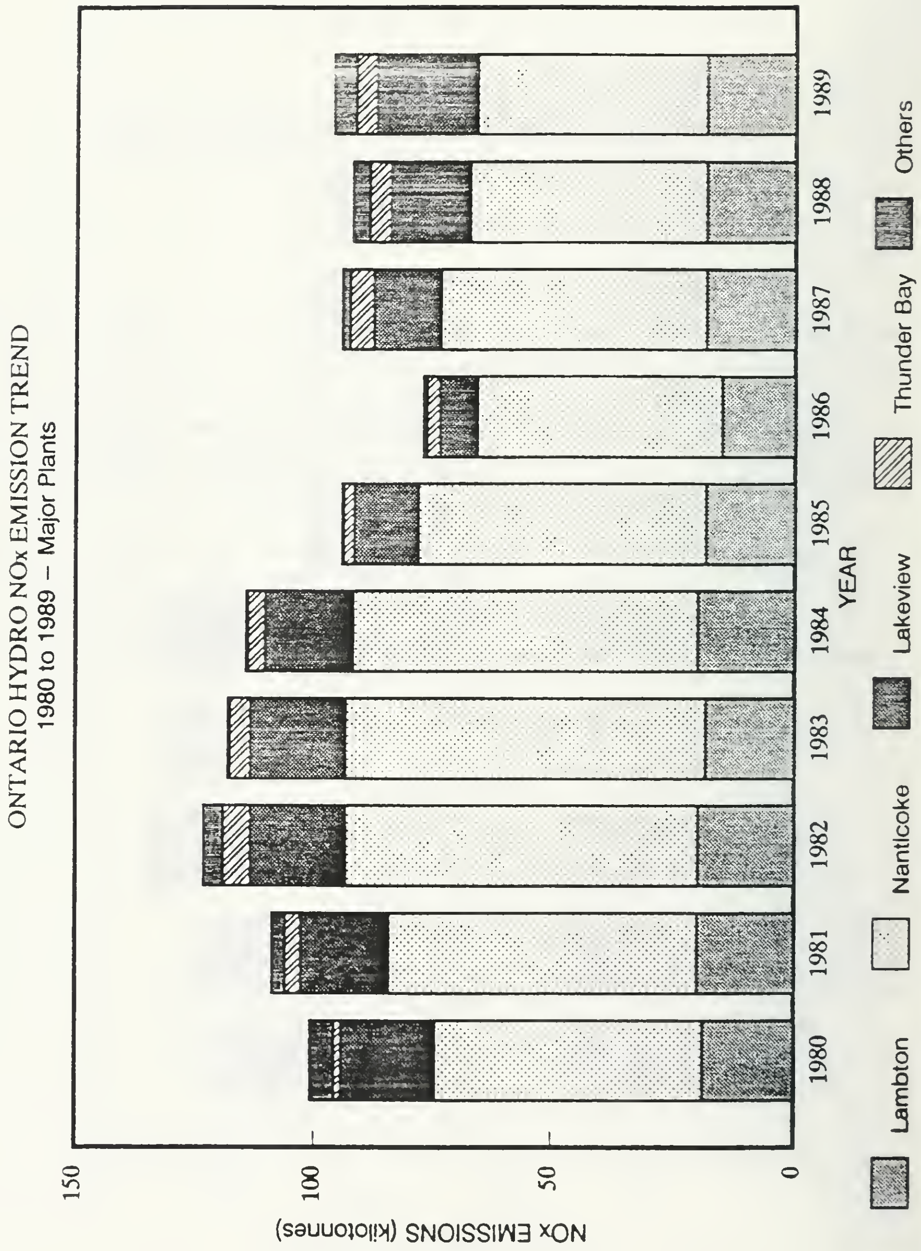

ONTARIO HYDRO NOx EMISSION TREND
1980 to 1989 – Major Plants

ONTARIO TOTAL EMISSIONS BY SECTOR

YEAR = 1985
(Tonnes/Year)

SECTOR	SO2	(%)	NOx	(%)	VOC (a)	(%)	PART	(%)	CO	(%)
Total Vehicles (b)	17,316	1.2%	254,394	45.6%	218,908	35.0%	33,421	17.3%	1,707,131	67.3%
Off-Highway Engines	3,335	0.2%	47,644	8.5%	23,248	3.7%	4,269	2.2%	128,696	5.1%
Railroad(c)	2,241	0.2%	28,189	5.1%	1,369	0.2%	1,521	0.8%	11,271	0.4%
Aircrafts (d)	511	0.0%	10,110	1.8%	3,346	0.5%	310	0.2%	37,845	1.5%
Marine	6,531	0.4%	5,678	1.0%	11,295	1.8%	486	0.3%	35,664	1.4%
Residential	11,144	0.8%	15,351	2.8%	34,574	5.5%	49,840	25.8%	199,267	7.9%
Commercial	1,985	0.1%	9,165	1.6%	454	0.1%	486	0.3%	1,223	0.0%
Industrial	10,202	0.7%	4,576	0.8%	55	0.0%	4,648	2.4%	673	0.0%
Incineration(e)	705	0.0%	2,843	0.5%	1,933	0.3%	12,451	6.4%	47,507	1.9%
Fire & VOC evap. processes	0	0.0%	1,463	0.3%	271,104	43.3%	6,125	3.2%	12,457	0.5%
** AREA-SOURCE SUBTOTAL	53,971	3.7%	379,413	68.1%	566,286	90.5%	113,556	58.7%	2,181,733	86.0%
Electric Utilities	336,665	23.1%	94,542	17.0%	440	0.1%	6,902	3.6%	3,311	0.1%
Non-Fe Smelters	769,352	52.8%	4,914	0.9%	35	0.0%	8,326	4.3%	143	0.0%
Other Primary Metals	26,679	1.8%	14,198	2.5%	6,808	1.1%	10,445	5.4%	205,223	8.1%
Petroleum Refineries	60,365	4.1%	17,536	3.1%	12,103	1.9%	5,032	2.6%	46,060	1.8%
Pulp & Paper	29,610	2.0%	11,713	2.1%	6,200	1.0%	25,043	12.9%	37,711	1.5%
Chemicals	10,204	0.7%	14,725	2.6%	16,466	2.6%	3,196	1.7%	3,976	0.2%
Other Manufactures	34,367	2.4%	15,071	2.7%	16,272	2.6%	15,098	7.8%	6,302	0.2%
Mining & Ore processing	130,542	9.0%	1,189	0.2%	13	0.0%	3,197	1.7%	47,535	1.9%
Miscellaneous	5,246	0.4%	4,199	0.8%	786	0.1%	2,586	1.3%	5,729	0.2%
** POINT-SOURCE SUBTOTAL	1,403,029	96.3%	178,087	31.9%	59,126	9.5%	79,825	41.3%	355,989	14.0%
*** TOTAL	1,457,000	100.0%	557,500	100.0%	625,411	100.0%	193,382	100.0%	2,537,721	100.0%

Notes:

(a) Area: inclides forest fire, excludes emissions from landfills, natural and other open sources.
Points: revised & updated Petro, chemical sectors from Levelton Reports, C&P new surveys in 1990 for VOC.
(b) Vehicles: 1985 NOx, VOC (C&P), CO (MOE) factors from Mobile 4C.
(c) New C&P factors for NOx, VOC.
(d) Includes inflight emissions.
(e) Particulates: excluding emissions from pesticde applications (85 C&P estimated: 52KT).

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ONTARIO TOTAL EMISSIONS BY SECTOR

YEAR = 1986
(Tonnes/Year)

SECTOR	SO2	(%)	NOx	(%)	VOC (a)	(%)	PART	(%)	CO	(%)
Total Vehicles (b)	17,742	1.3%	261,915	46.8%	226,971	33.1%	34,563	7.9%	1,769,503	61.2%
Off-Highway Engines	3,429	0.3%	48,038	8.6%	25,349	3.7%	4,401	1.0%	143,582	5.0%
Railroad(c)	1,982	0.1%	24,937	4.5%	1,211	0.2%	1,346	0.3%	9,970	0.3%
Aircrafts (d)	696	0.1%	11,942	2.1%	5,437	0.8%	450	0.1%	43,073	1.5%
Marine	7,442	0.6%	8,364	1.5%	13,445	2.0%	661	0.2%	37,499	1.3%
Residential	11,506	0.9%	15,331	2.7%	34,781	5.1%	50,133	11.5%	200,410	6.9%
Commercial	2,358	0.2%	7,061	1.3%	300	0.0%	184	0.0%	1,584	0.1%
Industrial	14,982	1.1%	4,741	0.8%	42	0.0%	7,002	1.6%	486	0.0%
Incineration(e)	727	0.1%	3,195	0.6%	4,529	0.7%	13,384	3.1%	50,648	1.8%
Fire & VOC evap. processes	0	0.0%	7,131	1.3%	309,255	45.1%	244,540	56.2%	267,749	9.3%
** AREA-SOURCE SUBTOTAL	60,864	4.5%	392,655	70.1%	621,319	90.6%	356,664	81.9%	2,524,504	87.2%
Electric Utilities	269,766	20.1%	77,384	13.8%	372	0.1%	6,433	1.5%	2,784	0.1%
Non-Fe Smelters	725,055	53.9%	4,536	0.8%	33	0.0%	8,304	1.9%	139	0.0%
Other Primary Metals(*)	29,095	2.2%	13,113	2.3%	9,546	1.4%	13,624	3.1%	214,153	7.4%
Petroleum Refineries	67,531	5.0%	17,760	3.2%	12,378	1.8%	6,048	1.4%	50,587	1.7%
Pulp & Paper	28,578	2.1%	12,052	2.2%	6,549	1.0%	26,759	6.1%	36,623	1.3%
Chemicals	10,650	0.8%	17,080	3.1%	16,196	2.4%	2,688	0.6%	4,385	0.2%
Other Manufactures	35,881	2.7%	20,168	3.6%	18,810	2.7%	8,866	2.0%	13,233	0.5%
Mining & Ore processing	114,162	8.5%	958	0.2%	13	0.0%	3,564	0.8%	41,077	1.4%
Miscellaneous	3,853	0.3%	4,041	0.7%	744	0.1%	2,548	0.6%	5,944	0.2%
** POINT-SOURCE SUBTOTAL	1,284,570	95.5%	167,091	29.9%	64,639	9.4%	78,835	18.1%	368,924	12.8%
*** TOTAL	1,345,434	100.0%	559,746	100.0%	685,959	100.0%	435,499	100.0%	2,893,428	100.0%

Notes:

(a) Area: inclides forest fire, excludes emissions from landfills, natural and other open sources.
Points: revised & updated Petro, chemical sectors from Levelton Reports, C&P new surveys in 1990 for VOC.
(b) Vehicles: 1985 NOx, VOC (C&P), CO (MOE) factors from Mobile 4C with updated 1986 Ontario data.
(c) New C&P factors for NOx, VOC.
(d) Includes inflight emissions.
(e) Particulates: excluding emissions from pesticde applications (85 C&P estimated: 52KT).
(*) Tentative

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ONTARIO TOTAL EMISSIONS BY SECTOR

YEAR = 1987
(Tonnes/Year)

SECTOR	SO2	(%)	NOx	(%)	VOC (a)	(%)	PART	(%)	CO	(%)
Total Vehicles (b)	18,609	1.3%	273,794	46.8%	236,409	34.8%	36,019	11.1%	1,841,895	64.9%
Off-Highway Engines	3,528	0.3%	49,178	8.4%	26,329	3.9%	4,588	1.4%	145,388	5.1%
Railroad(c)	2,042	0.1%	25,682	4.4%	1,247	0.2%	1,386	0.4%	10,268	0.4%
Aircrafts (d)	705	0.1%	12,005	2.1%	5,505	0.8%	466	0.1%	43,303	1.5%
Marine	9,451	0.7%	6,284	1.1%	13,117	1.9%	628	0.2%	37,041	1.3%
Residential	10,035	0.7%	14,639	2.5%	35,342	5.2%	50,907	15.6%	203,649	7.2%
Commercial	2,246	0.2%	5,615	1.0%	225	0.0%	150	0.0%	1,286	0.0%
Industrial	16,741	1.2%	6,183	1.1%	64	0.0%	8,314	2.6%	757	0.0%
Incineration(e)	721	0.1%	2,907	0.5%	4,412	0.6%	12,733	3.9%	48,581	1.7%
Fire & VOC evap. processes	0	0.0%	4,035	0.7%	290,774	42.8%	129,022	39.6%	144,152	5.1%
** AREA-SOURCE SUBTOTAL	64,079	4.5%	400,324	68.4%	613,424	90.4%	244,213	75.0%	2,476,320	87.3%
Electric Utilities	332,492	23.6%	94,629	16.2%	485	0.1%	8,910	2.7%	3,629	0.1%
Non-Fe Smelters	730,672	51.9%	4,715	0.8%	34	0.0%	7,958	2.4%	146	0.0%
Other Primary Metals(*)	29,346	2.1%	13,192	2.3%	9,550	1.4%	14,474	4.4%	214,206	7.5%
Petroleum Refineries	73,203	5.2%	18,162	3.1%	12,917	1.9%	6,292	1.9%	47,259	1.7%
Pulp & Paper	28,573	2.0%	12,135	2.1%	6,587	1.0%	26,759	8.2%	37,185	1.3%
Chemicals	11,001	0.8%	16,647	2.8%	16,214	2.4%	2,157	0.7%	4,430	0.2%
Other Manufactures	34,873	2.5%	20,160	3.4%	18,898	2.8%	8,813	2.7%	13,286	0.5%
Mining & Ore processing	100,937	7.2%	938	0.2%	12	0.0%	3,385	1.0%	34,922	1.2%
Miscellaneous	4,002	0.3%	4,066	0.7%	743	0.1%	2,559	0.8%	5,944	0.2%
** POINT-SOURCE SUBTOTAL	1,345,098	95.5%	184,645	31.6%	65,440	9.5%	81,307	25.0%	361,006	12.7%
*** TOTAL	1,409,176	100.0%	584,968	100.0%	678,864	100.0%	325,520	100.0%	2,837,326	100.0%

Notes:

(a) Area: inclides forest fire, excludes emissions from landfills, natural and other open sources.
Points: revised & updated Petro, chemical sectors from Levelton Reports, C&P new surveys in 1990 for VOC.
(b) Vehicles: 1985 NOx, VOC (C&P), CO (MOE) factors from Mobile 4C with updated 1987 Ontario data.
(c) New C&P factors for NOx, VOC.
(d) Includes inflight emissions.
(e) Particulates: excluding emissions from pesticide applications (85 C&P estimated: 52KT).
(*) Tentative

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ONTARIO TOTAL EMISSIONS BY SECTOR

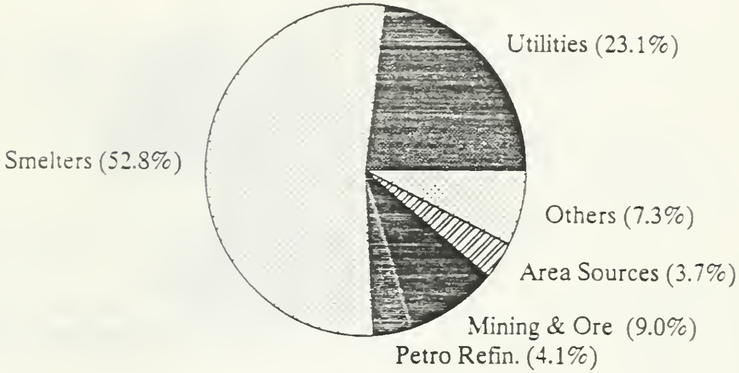
YEAR = 1988 (Tentative)
(Tonnes/Year)

SECTOR	SO2	(%)	NOx	(%)	VOC (a)	(%)	PART	(%)	CO	(%)
Total Vehicles (b)	19,596	1.4%	287,269	46.5%	247,121	31.9%	37,667	4.4%	1,923,820	55.0%
Off-Highway Engines	3,306	0.2%	45,004	7.3%	27,858	3.6%	4,499	0.5%	167,920	4.8%
Railroad(c)	2,857	0.2%	35,934	5.8%	1,745	0.2%	1,939	0.2%	14,367	0.4%
Aircrafts (d)	724	0.1%	12,190	2.0%	5,669	0.7%	490	0.1%	43,578	1.2%
Marine	8,550	0.6%	6,065	1.0%	13,284	1.7%	586	0.1%	37,588	1.1%
Residential	10,400	0.8%	15,721	2.5%	35,976	4.6%	51,792	6.1%	207,226	5.9%
Commercial	2,771	0.2%	6,440	1.0%	262	0.0%	200	0.0%	1,451	0.0%
Industrial	19,047	1.4%	5,584	0.9%	44	0.0%	9,141	1.1%	502	0.0%
Incineration(e)	733	0.1%	2,956	0.5%	4,485	0.6%	12,946	1.5%	49,393	1.4%
Fire & VOC evap. processes	0	0.0%	17,694	2.9%	373,504	48.2%	646,601	76.2%	693,136	19.8%
** AREA-SOURCE SUBTOTAL	67,983	4.9%	434,856	70.4%	709,949	91.6%	765,861	90.3%	3,138,982	89.7%
Electric Utilities	320,595	23.2%	92,487	15.0%	530	0.1%	10,734	1.3%	4,025	0.1%
Non-Fe Smelters	718,350	52.0%	4,710	0.8%	35	0.0%	7,271	0.9%	146	0.0%
Other Primary Metals	29,362	2.1%	13,176	2.1%	9,555	1.2%	14,437	1.7%	214,719	6.1%
Petroleum Refineries	73,203	5.3%	18,162	2.9%	12,917	1.7%	6,292	0.7%	47,259	1.4%
Pulp & Paper	28,573	2.1%	12,135	2.0%	6,587	0.8%	26,759	3.2%	37,185	1.1%
Chemicals	11,001	0.8%	16,647	2.7%	16,214	2.1%	2,157	0.3%	4,430	0.1%
Other Manufactures	34,873	2.5%	20,160	3.3%	18,898	2.4%	8,813	1.0%	13,286	0.4%
Mining & Ore processing	93,250	6.8%	965	0.2%	12	0.0%	3,297	0.4%	32,872	0.9%
Miscellaneous	4,002	0.3%	4,066	0.7%	743	0.1%	2,559	0.3%	5,944	0.2%
** POINT-SOURCE SUBTOTAL	1,313,207	95.1%	182,509	29.6%	65,490	8.4%	82,318	9.7%	359,866	10.3%
*** TOTAL	1,381,190	100.0%	617,365	100.0%	775,439	100.0%	848,179	100.0%	3,498,848	100.0%

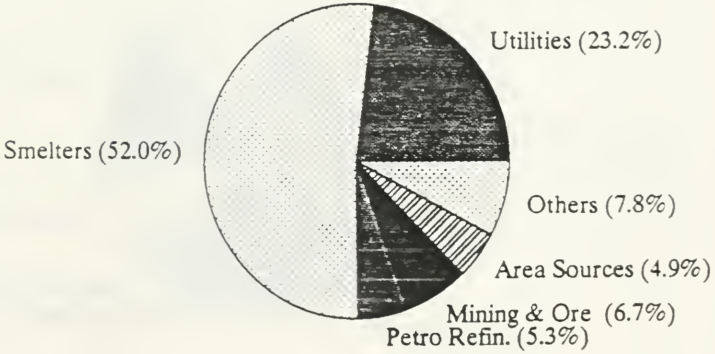
Notes:

(a) Area: inclides forest fire, excludes emissions from landfills, natural and other open sources.
Points: revised & updated Petro, chemical sectors from Levelton Reports, C&P new surveys in 1990 for VOC.
(b) Vehicles: 1985 NOx, VOC (C&P), CO (MOE) factors from Mobile 4C with updated 1988 Ontario data.
(c) New C&P factors for NOx, VOC.
(d) Includes inflight emissions.
(e) Particulates: excluding emissions from pesticde applications (85 C&P estimated: 52KT).

1985 ONTARIO SO2 EMISSION DISTRIBUTION
Major Sectors – 1.457 million tonnes

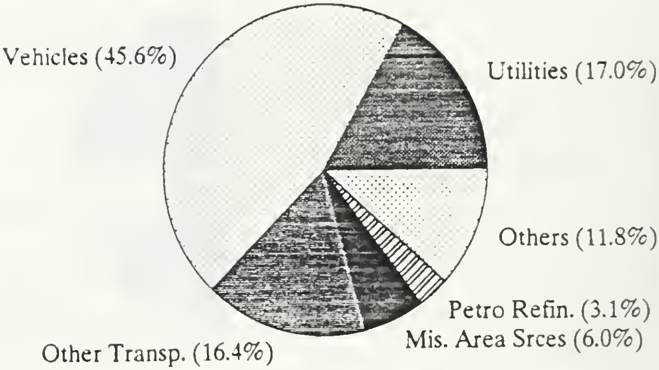


1988 ONTARIO SO2 EMISSION DISTRIBUTION
Major Sectors – 1.381 million tonnes(*)

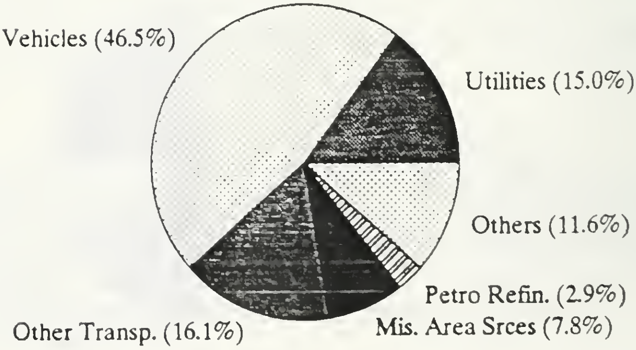


(*) Tentative

1985 ONTARIO NOx EMISSION DISTRIBUTION
Major Sectors – 558 kilotonnes

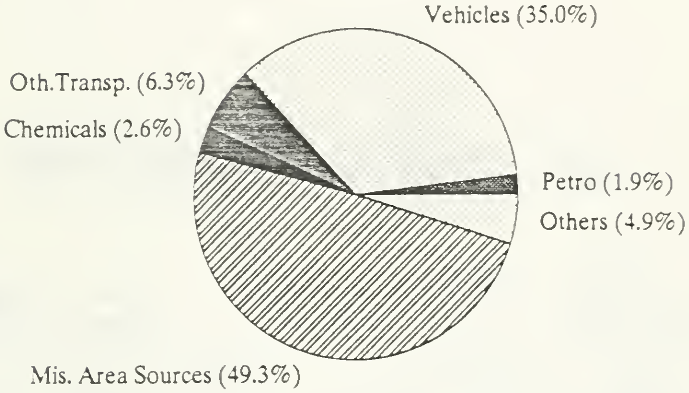


1988 ONTARIO NOx EMISSION DISTRIBUTION
Major Sectors – 617 kilotonnes(*)

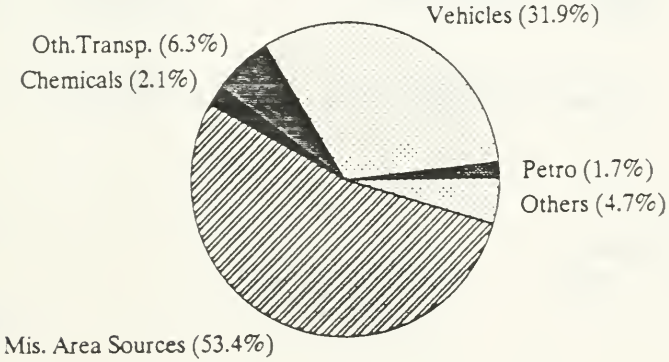


(*) Tentative

1985 ONTARIO VOC EMISSION DISTRIBUTION
Major Sectors – 625 kilotonnes



1988 ONTARIO VOC EMISSION DISTRIBUTION
Major Sectors – 775 kilotonnes(*)



(*) Tentative

MAJOR SO2 POINT SOURCES IN ONTARIO - 1985

Rank	NAME	CITY	SO2 (Tonnes)	Ontario Percent
1	Inco	Sudbury	695,000	47.7%
2	Nanticoke Gs	Nanticoke	169,000	11.6%
3	Lambton Gs	Courtright	118,000	8.1%
4	Algoma Ore	Wawa	115,890	8.0%
5	Falconbridge	Falconbridge	74,352	5.1%
6	Lakeview Gs	Mississauga	43,800	3.0%
7	Imperial Oil	Sarnia	19,595	1.3%
8	Shell Can	Corunna	16,105	1.1%
9	Lake Ont. Cement	Picton	7,748	0.5%
10	Algoma Steel	Sault Ste Marie	7,419	0.5%
	TOTAL OF 10 MAJOR SOURCES :		1,266,909	87.0%

*** Ontario provincial total = 1,457,000

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MAJOR SO2 POINT SOURCES IN ONTARIO - 1987

Rank	NAME	CITY	SO2 (Tonnes)	Ontario Percent
1	Inco	Sudbury	658,548	46.7%
2	Nanticoke Gs	Nanticoke	169,000	12.0%
3	Lambton Gs	Courtright	105,000	7.5%
4	Algoma Ore	Wawa	86,771	6.2%
5	Falconbridge	Falconbridge	72,000	5.1%
6	Lakeview Gs	Mississauga	45,700	3.2%
7	Imperial Oil	Sarnia	28,334	2.0%
8	Shell Can	Corunna	14,646	1.0%
9(*)	Algoma Steel	Sault Ste Marie	10,983	0.8%
10	Thunder Bay Gs	Thunder Bay	8,540	0.6%
	TOTAL OF 10 MAJOR SOURCES :		1,199,522	85.1%

*** Ontario provincial total = 1,409,176

(*) Tentative

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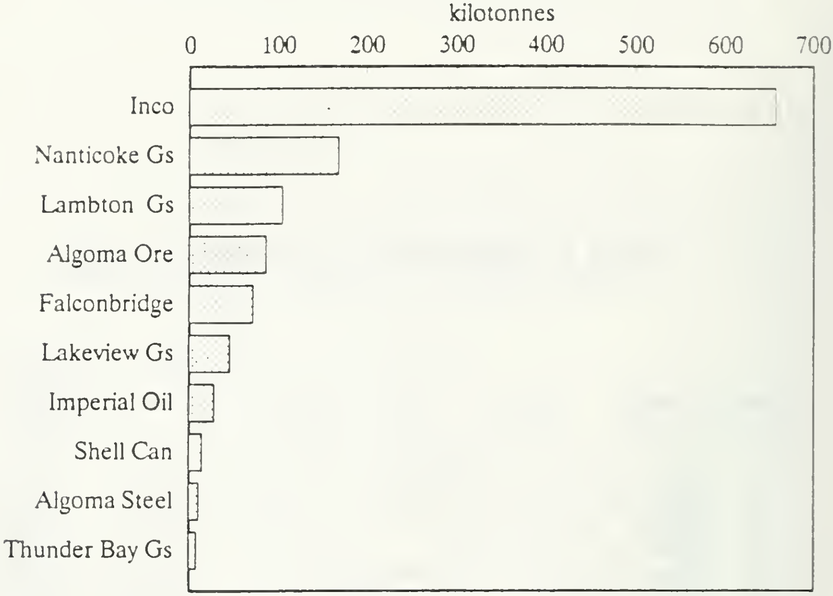
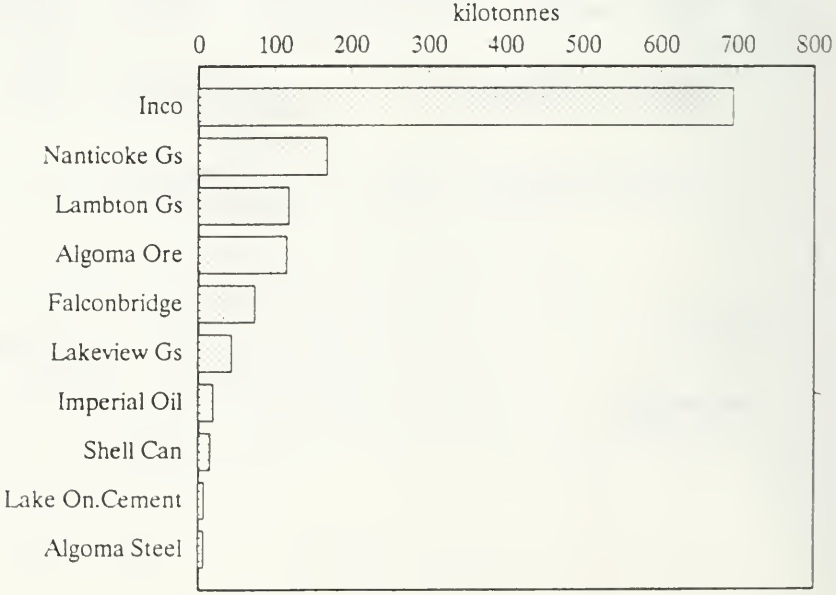
EMISSIONS from ONTARIO MAJOR SO2 POINT SOURCES in 1987



EMISSIONS from ONTARIO MAJOR SO2 POINT SOURCES in 1985



MAJOR NOx POINT SOURCES IN ONTARIO - 1985

Rank	NAME	CITY	NOx (Tonnes)	Ontario Percent
1	Nanticoke Gs	Nanticoke	59,799	10.7%
2	Lambton Gs	Courtright	18,400	3.3%
3	Lakeview Gs	Mississauga	13,646	2.4%
4	Stelco	Hamilton	5,568	1.0%
5	Petrosar	Corunna	5,525	1.0%
6	Inco	Sudbury	4,893	0.9%
7	Esso Chemicals	Sarnia	3,993	0.7%
8	Imperial Oil	Sarnia	3,629	0.7%
9	Algoma Steel	Sault Ste Marie	3,207	0.6%
10	Dow Chemicals	Sarnia	3,080	0.6%
	TOTAL OF 10 MAJOR SOURCES :		121,738	21.8%

*** Ontario provincial total = 557,500

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MAJOR NOx POINT SOURCES IN ONTARIO - 1987

Rank	NAME	CITY	NOx (Tonnes)	Ontario Percent
1	Nanticoke Gs	Nanticoke	55,199	9.4%
2	Lambton Gs	Courtright	18,400	3.1%
3	Lakeview Gs	Mississauga	14,260	2.4%
4(*)	Stelco	Hamilton	5,796	1.0%
5(*)	Petrosar	Corunna	5,525	0.9%
6	Thunder Bay Gs	Thunder Bay	4,907	0.8%
7	Inco	Sudbury	4,636	0.8%
8(*)	Esso Chemicals	Sarnia	3,993	0.7%
9(*)	St Lawr.Cement	Mississauga	3,233	0.6%
10(*)	Dow Chemicals	Sarnia	3,080	0.5%
	TOTAL OF 10 MAJOR SOURCES :		119,027	20.3%

Ontario provincial total = 584,968

(*) Tentative

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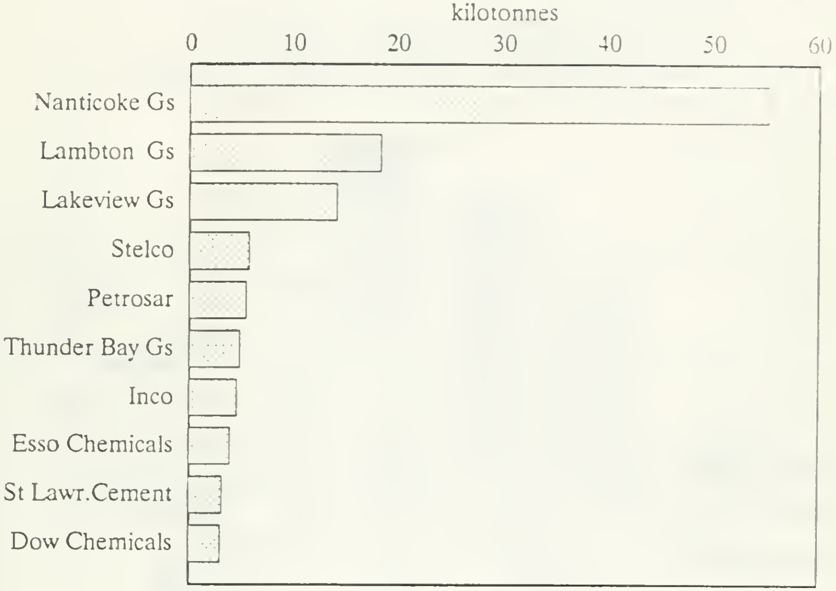
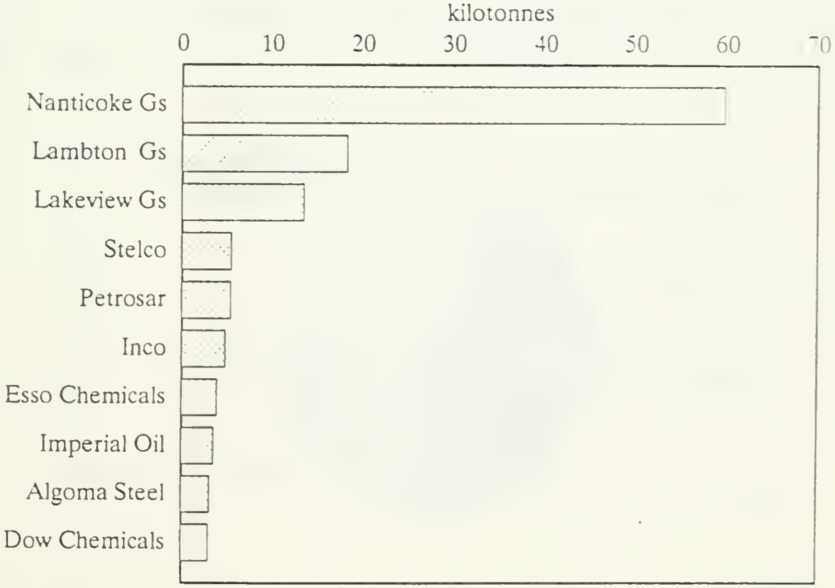
EMISSIONS from ONTARIO MAJOR NOx POINT SOURCES in 1987



EMISSIONS from ONTARIO MAJOR NOx POINT SOURCES in 1985



1988 ONTARIO CARBON DIOXIDE EMISSIONS

Kilotonnes

SECTOR	OIL	NAT.GAS	NGL	COAL	WOOD/ WASTE	CO2 TOTAL
Residential	4,664	12,122	670	0	1,548	19,004
Commericial	3,172	7,509	179	0	0	10,860
Industrial	7,053	17,330	377	18,223	7,100	50,083
Transportation	41,775	25	622	0	0	42,422
Electric Utilities	589	447	0	31,274	0	32,310
Others	5,873	3,766	24	0	0	9,663
ONTARIO TOTAL	63,126	41,199	1,872	49,497	8,648	164,342

Source: Ontario Ministry of Energy, Economics & Forecast Section,
February 1990.

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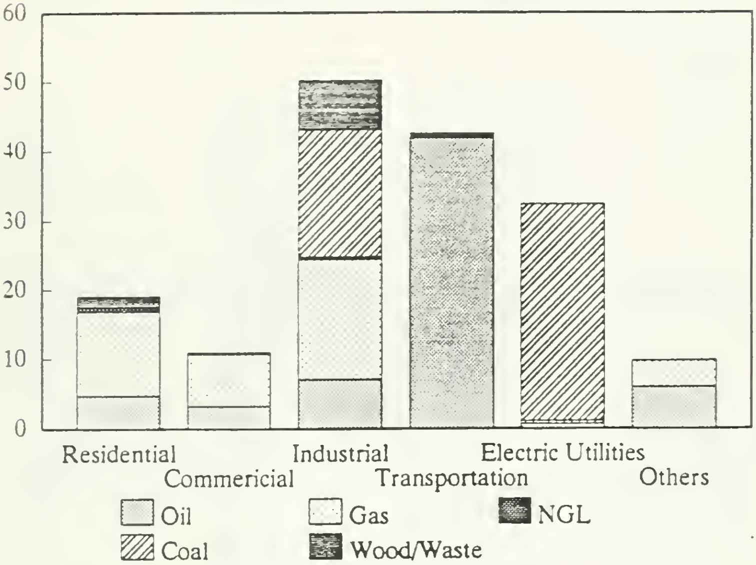
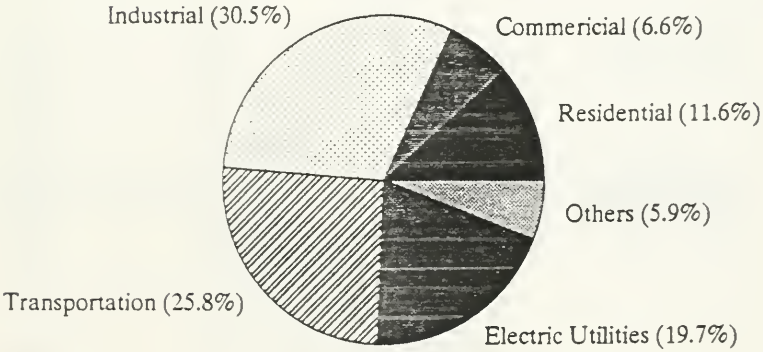


1988 CARBON DIOXIDE EMISSIONS in ONTARIO
By Sector & Fuel Type – Million Tonnes



1988 ONTARIO CARBON DIOXIDE DISTRIBUTION
Major Sectors – 164 million tonnes

1985 AMMONIA & ALKALINE DUST EMISSIONS IN ONTARIO

POLLUTANT	CATEGORY	Tonnes	Percent
AMMONIA			
Natural Sources	Soils	52,954	46.5
	Amimal Waste	10,418	9.2
	Forest Fires	3	0.0
	Human Breath	50	0.0
	Subtotal:	63,425	55.7
Anthropogenic Area Sources	Combustion	537	0.5
	Incineration	37	0.0
	Livestock Manageme	33,208	29.2
	Fertilizer Applica	1,705	1.5
	Cigarette Smoking	2	0.0
	Subtotal:	35,489	31.2
Anthropogenic Point Sources	Industrial	14,781	13.0
	Incineration	78	0.1
	Subtotal:	14,859	13.1
		113,773	100.0
ALKALINE DUST			
Natural Sources	Soils	60,789	3.9
	Forest Fires	2	0.0
	Subtotal:	60,791	3.9
Anthropogenic Area Sources	Combustion	1,214	0.1
	Transportion	118	0.0
	Open Sources(a)	1,466,491	93.2
	Open Burning	<1	0.0
	Subtotal:	1,467,823	93.3
Anthropogenic Point Sources	Industrial	43,090	2.7
	Combustion	<1	0.0
	Incineration	1,037	0.1
	Subtotal:	44,127	2.8
	ALKALINE DUST	1,572,741	100.0

(a) Open Sources: including paved and unpaved roads.

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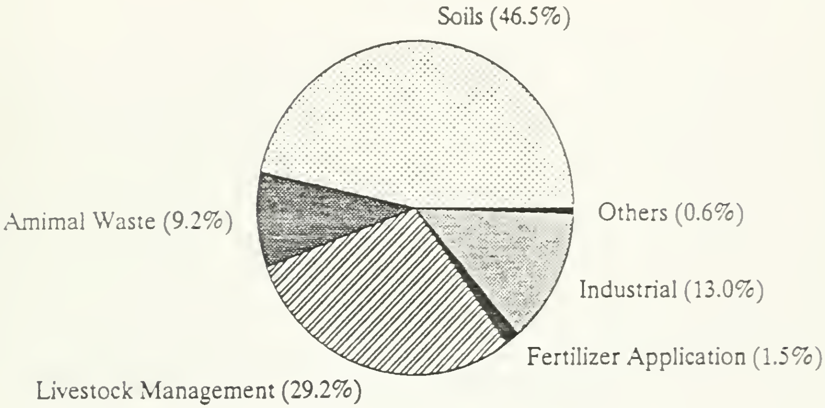
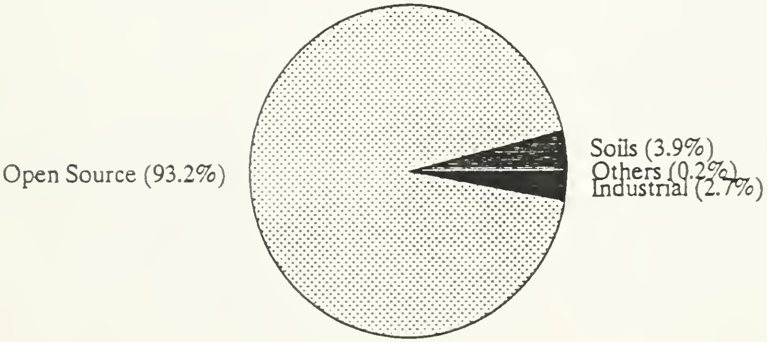
1985 ONTARIO AMMONIA EMISSIONS
Major Sectors – 114 kilotonnes



1985 ONTARIO ALKALINE DUST EMISSIONS
Major Sector – 1.6 million tonnes



SECTION B: CANADA EMISSIONS

1970 - 1985 CANADA SO2 EMISSION TREND

(1,000 Tonnes)

PROVINCE	1970	1972	1974	1976	1978	1980	1981	1982	1983	1984	1985
MANITOBA	760	718	714	590	485	484	421	362	408	466	469
NEW BRUNSWICK	133	178	152	162	191	220	221	206	172	162	138
NEWFOUNDLAND	54	40	68	53	53	56	41	42	36	38	43
NOVA SCOTIA	144	163	170	171	175	193	193	179	175	201	170
ONTARIO	3,226	2,674	2,315	2,227	1,594	1,764	1,646	1,142	1,276	1,571	1,457
P.E.ISLAND	9	10	10	9	6	5	3	3	2	2	2
QUEBEC	1,309	1,351	1,335	1,145	1,131	1,098	1,002	932	792	737	693
EASTERN TOTAL	5,636	5,135	4,763	4,357	3,635	3,819	3,527	2,867	2,862	3,176	2,972
ALBERTA	624	757	656	536	551	599	543	504	513	517	539
BRITISH COLUMBIA	359	428	404	371	254	167	166	160	155	151	105
NW TERRITORY/YUKON	2	3	3	3	3	2	2	2	2	2	2
SASKATCHEWAN	56	52	55	53	63	55	56	82	97	111	86
WESTERN TOTAL	1,041	1,240	1,118	963	871	823	767	747	767	781	731
CANADA TOTAL	6,677	6,375	5,881	5,320	4,506	4,642	4,294	3,614	3,628	3,957	3,703

Sources: - Ontario: MOE data (80-85), C & P data (70-78).
- Other provinces: C & P report EPS 5/AP/3, March 1990, other years as of May 87.

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1970 - 1985 CANADA NOX EMISSION TREND

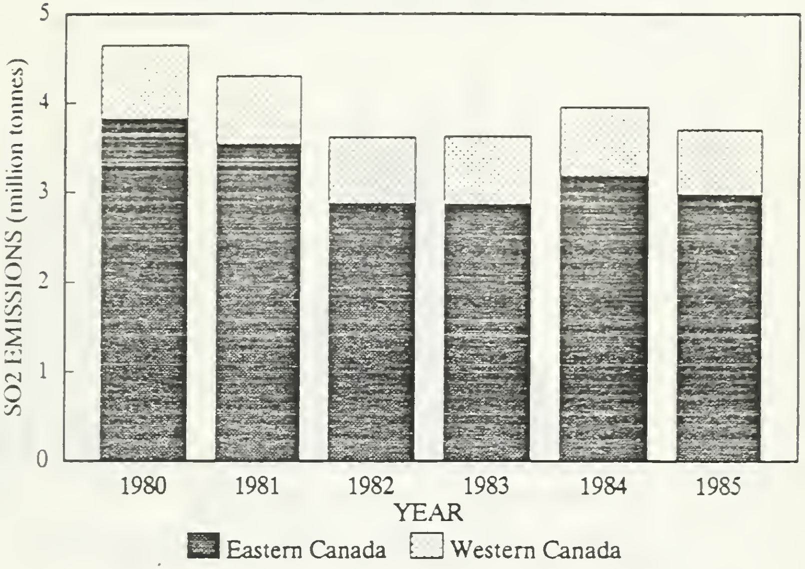
(1,000 Tonnes)

PROVINCE	1970	1972	1974	1976	1978	1980	1981	1982	1983	1984	1985
MANITOBA	61	68	79	81	81	80	78	75	79	76	82
NEW BRUNSWICK	39	48	50	53	62	58	56	52	48	49	46
NEWFOUNDLAND	27	27	37	31	30	36	35	34	33	33	34
NOVA SCOTIA	56	65	71	81	70	86	67	71	73	76	74
ONTARIO	425	485	507	526	572	571	559	546	561	558	558
P.E.ISLAND	6	6	8	8	7	7	6	6	6	6	6
QUEBEC	259	306	345	323	349	331	298	272	263	257	223
EASTERN TOTAL	872	1,005	1,097	1,103	1,172	1,168	1,099	1,056	1,063	1,055	1,022
ALBERTA	225	264	311	305	372	430	421	413	408	415	440
BRITISH COLUMBIA	155	179	216	206	192	225	214	235	239	243	253
NW TERRITORY/YUKON	14	35	17	67	26	15	16	16	16	16	16
SASKATCHEWAN	95	105	132	126	148	125	114	134	134	150	156
WESTERN TOTAL	489	583	677	705	738	795	765	798	797	824	865
CANADA TOTAL	1,361	1,588	1,774	1,808	1,910	1,963	1,864	1,854	1,860	1,879	1,887

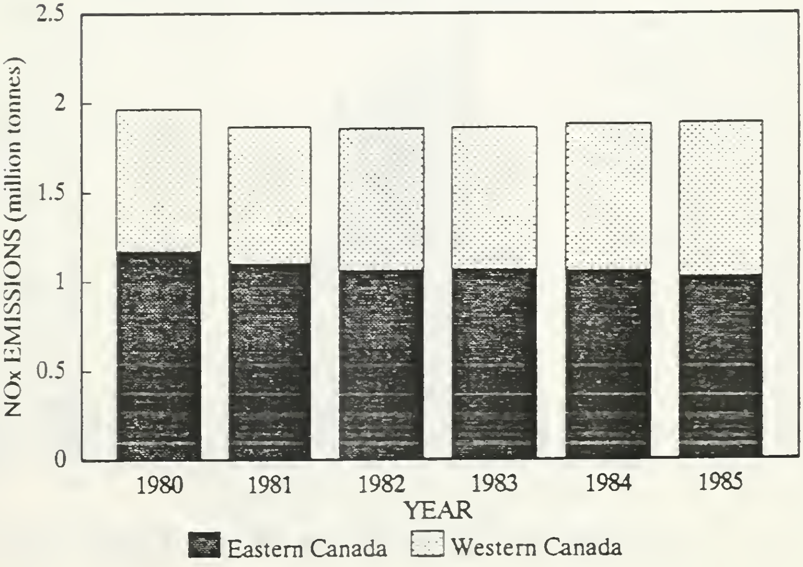
Sources: - Ontario: MOE data (80-85), C & P data (70-78).
- Other provinces: C & P report EPS 5/AP/3, March 1990, other years as of May 87

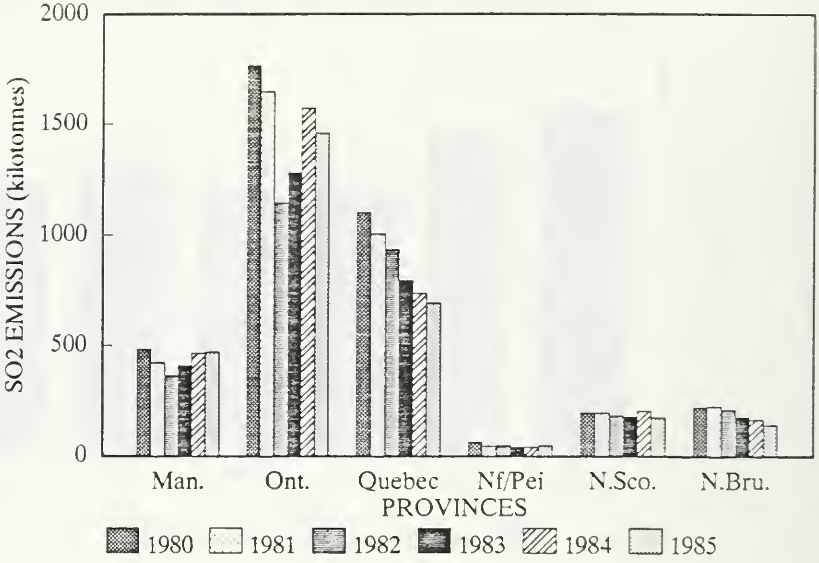
MOE/ARB/AQM/EI
Aug-90

CANADA SO2 EMISSION TREND
1980 TO 1985 – By Region

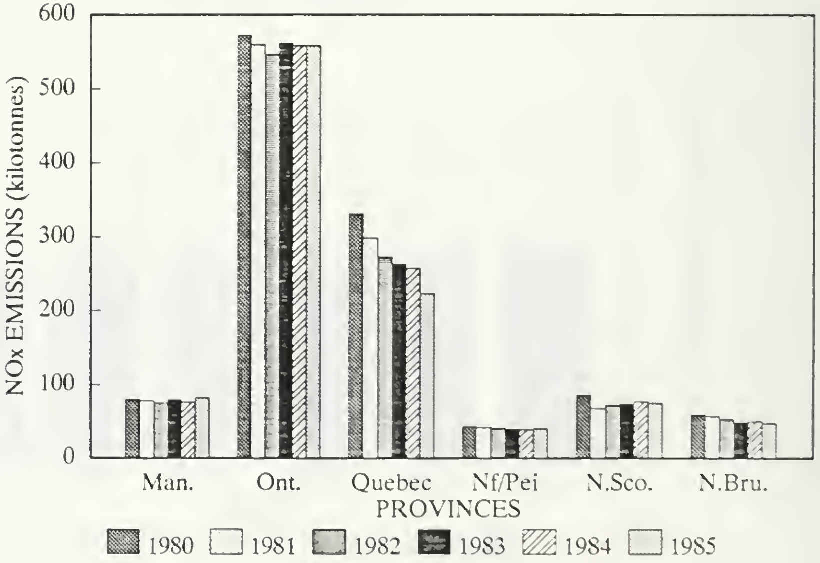


CANADA NOx EMISSION TREND
1980 TO 1985 – By Region

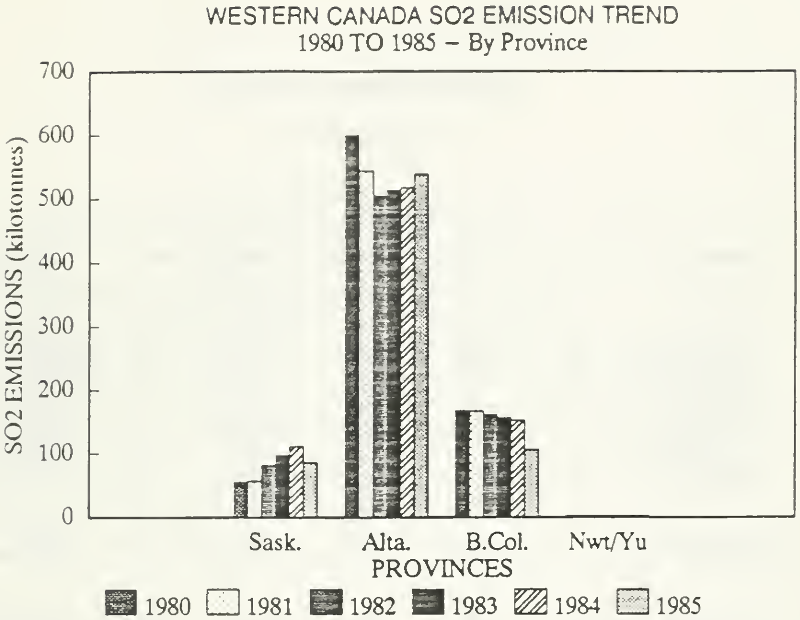


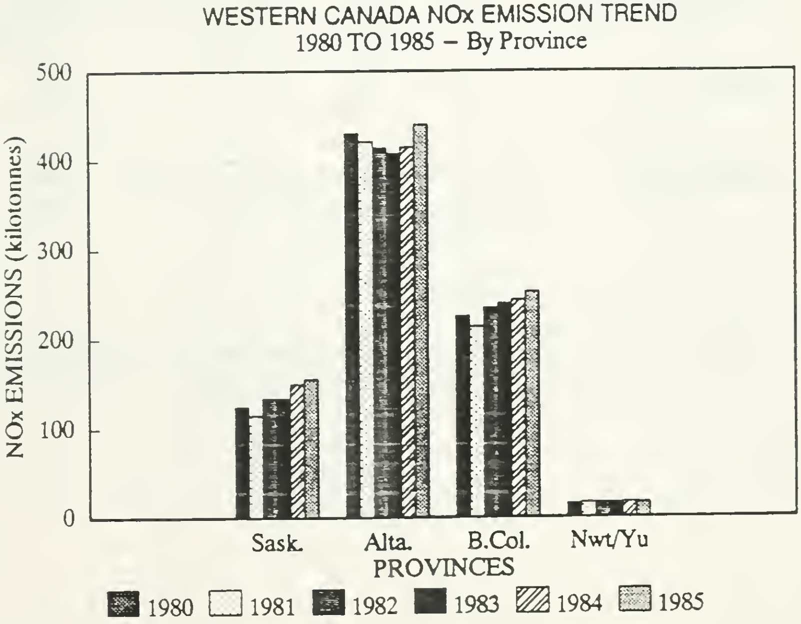


EASTERN CANADA SO2 EMISSION TREND
1980 TO 1985 – By Province



EASTERN CANADA NOx EMISSION TREND
1980 TO 1985 – By Province


WESTERN CANADA SO2 EMISSION TREND
1980 TO 1985 – By Province
SO2 EMISSIONS (kilotonnes)
700
600
500
400
300
200
100
0
Sask.
Alta.
B.Col.
Nwt/Yu
PROVINCES
1980
1981
1982
1983
1984
1985


WESTERN CANADA NOx EMISSION TREND
1980 TO 1985 – By Province
NOx EMISSIONS (kilotonnes)
500
400
300
200
100
0
Sask.
Alta.
B.Col.
Nwt/Yu
PROVINCES
1980
1981
1982
1983
1984
1985

1980 CANADA EMISSIONS

(1,000 Tonnes)

PROVINCE	SO2	NOx	VOC	PART	CO
MANITOBA	484	80	216	905	1,455
NEW BRUNSWICK	220	58	50	16	316
NEWFOUNDLAND	56	36	27	5	179
NOVA SCOTIA	193	86	71	8	357
ONTARIO	1,764	571	739	1,108	3,121
P.E.ISLAND	5	7	6	1	53
QUEBEC	1,098	331	379	98	2,187
EASTERN TOTAL	3,819	1,168	1,488	2,141	7,667
ALBERTA	599	430	655	1,542	2,744
BRITISH COLUMBIA	167	225	285	198	2,000
NW TERR / YUKON	2	15	360	2,220	2,413
SASKATCHEWAN	55	125	465	2,241	3,062
WESTERN TOTAL	823	795	1,766	6,201	10,219
CANADA TOTAL	4,642	1,963	3,255	8,342	17,885

Sources: - Ontario: MOE data (Total emissions).
- Other provinces: C & P 1980 data, incl. fire, excl. open source

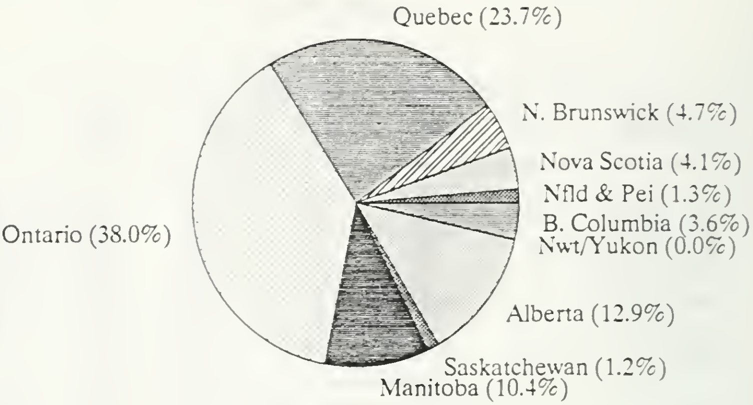
1985 CANADA EMISSIONS

(1,000 Tonnes)

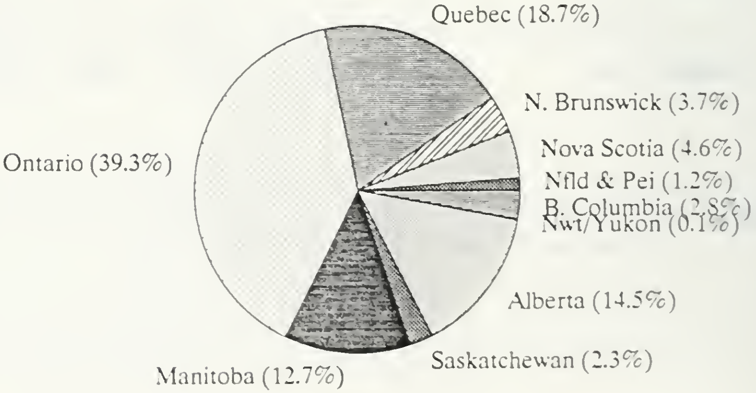
PROVINCE	SO2	NOx	VOC	PART	CO
MANITOBA	469	82	71	54	431
NEW BRUNSWICK	138	46	45	90	288
NEWFOUNDLAND	43	34	36	123	198
NOVA SCOTIA	170	74	52	72	299
ONTARIO	1,457	557	625	193	2,538
P.E.ISLAND	2	6	11	8	64
QUEBEC	693	223	372	310	1,915
EASTERN TOTAL	2,972	1,022	1,213	851	5,732
ALBERTA	539	440	229	219	1,277
BRITISH COLUMBIA	105	253	295	414	2,377
NW TERRITORY	2	14	5	4	33
SASKATCHEWAN	86	156	84	126	644
YUKON	0	2	2	7	13
WESTERN TOTAL	732	865	615	769	4,344
CANADA TOTAL	3,704	1,887	1,828	1,620	10,076

Sources: - Ontario: MOE data.
- Other provinces: C & P report EPS 5/AP/3, March 1990.

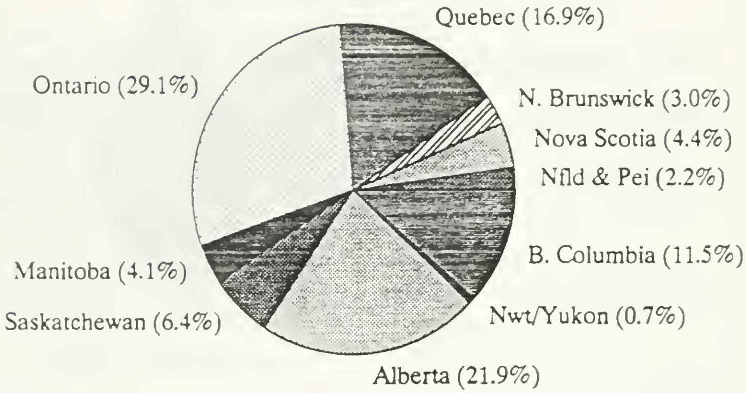
1980 CANADA SO2 EMISSION DISTRIBUTION
By Province – Total: 4.6 million tonnes



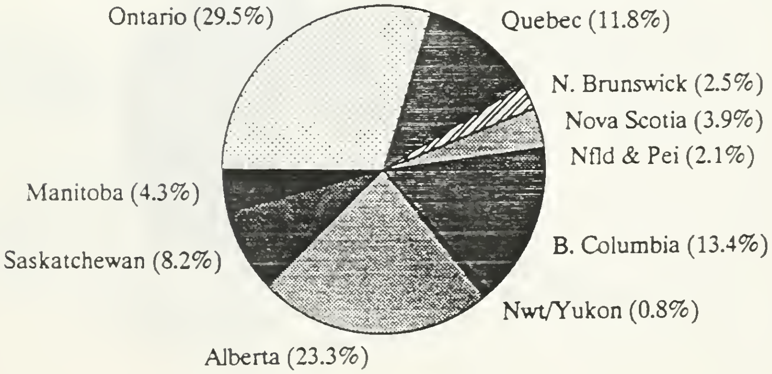
1985 CANADA SO2 EMISSION DISTRIBUTION
By Province – Total: 3.7 million tonnes



1980 CANADA NOx EMISSION DISTRIBUTION
By Province – Total: 1.96 million tonnes

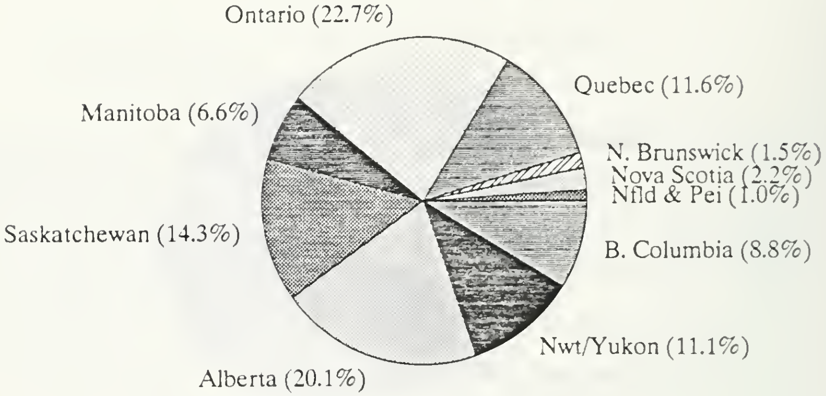


1985 CANADA NOx EMISSION DISTRIBUTION
By Province – Total: 1.9 million tonnes



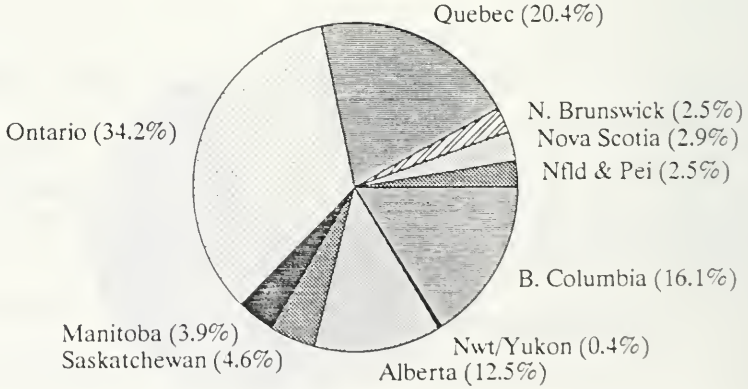
1980 CANADA VOC EMISSION DISTRIBUTION

By Province – Total: 3.2 million tonnes

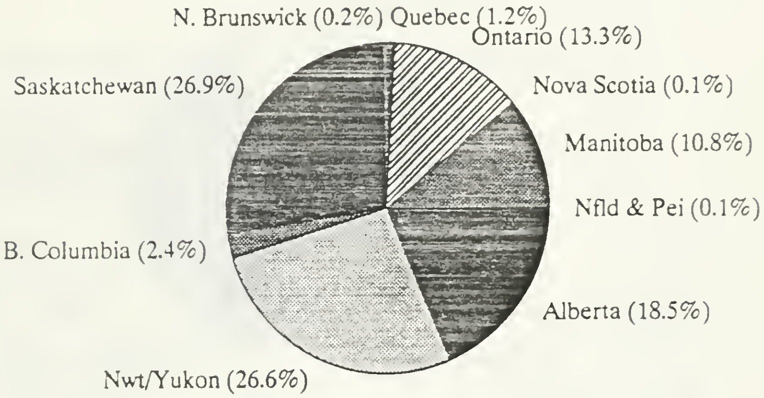


1985 CANADA VOC EMISSION DISTRIBUTION

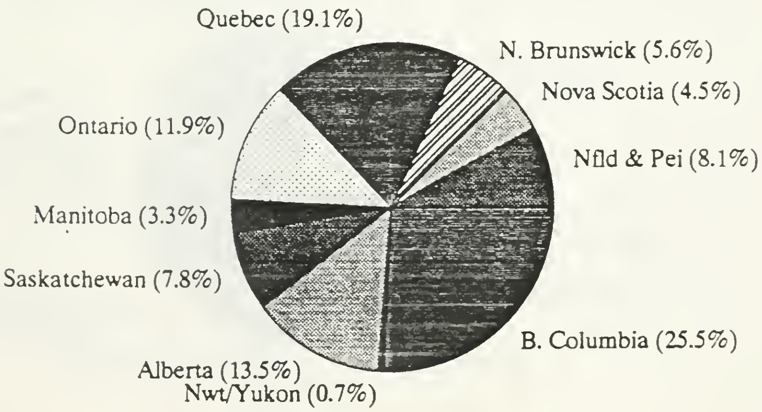
By Province – Total: 1.8 million tonnes



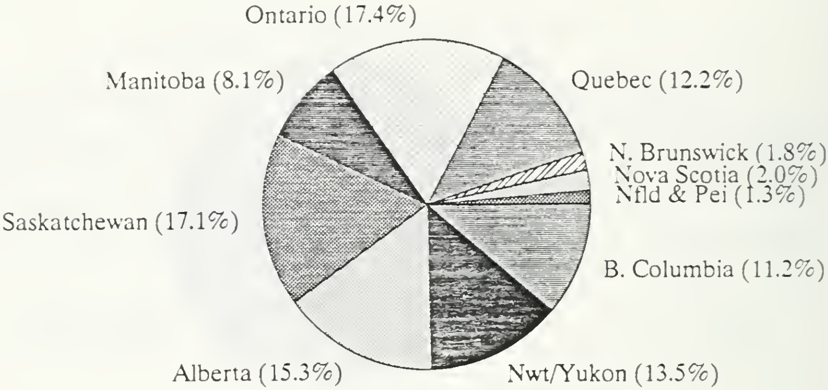
1980 CANADA PART. EMISSION DISTRIBUTION
By Province – Total: 8.3 million tonnes



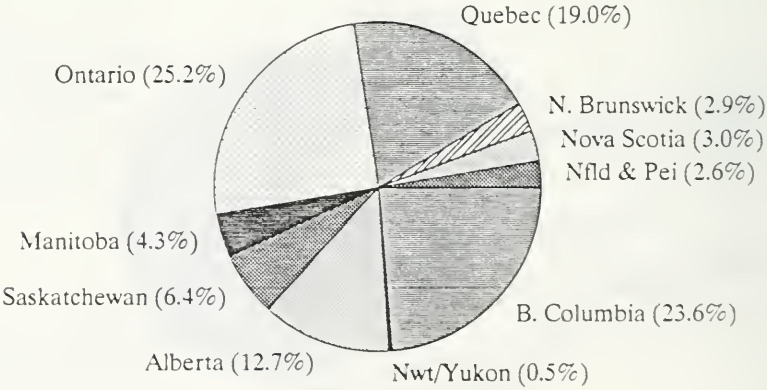
1985 CANADA PART. EMISSION DISTRIBUTION
By Province – Total: 1.6 million tonnes



1980 CANADA CO EMISSION DISTRIBUTION
By Province – Total: 17.9 million tonnes



1985 CANADA CO EMISSION DISTRIBUTION
By Province – Total: 10.1 million tonnes



MAJOR SO2 POINT SOURCES IN CANADA - 1980

Rank	NAME	PROVINCE	(Tonnes)	CANADA Percent
1	Inco	Ontario	812,118	17.5%
2	Noranda	Quebec	549,000	11.8%
3	Hudson Bay M&S	Manitoba	248,387	5.4%
4	Inco	Manitoba	219,000	4.7%
5	Algoma Ore - Wawa	Ontario	160,583	3.5%
6	Lambton Gs	Ontario	149,774	3.2%
7	Nanticoke Gs	Ontario	144,000	3.1%
8	Falconbridge	Ontario	123,333	2.7%
9	Gaspe	Quebec	90,000	1.9%
10	Lakeview Gs	Ontario	75,080	1.6%
	TOTAL OF 10 MAJOR SOURCES :		2,571,275	55.4%

***** CANADA TOTAL: 4,641,818**

SOURCES: - Ontario: MOE
- Other provinces: C & P, April, 1988.

MAJOR SO2 POINT SOURCES IN CANADA - 1985

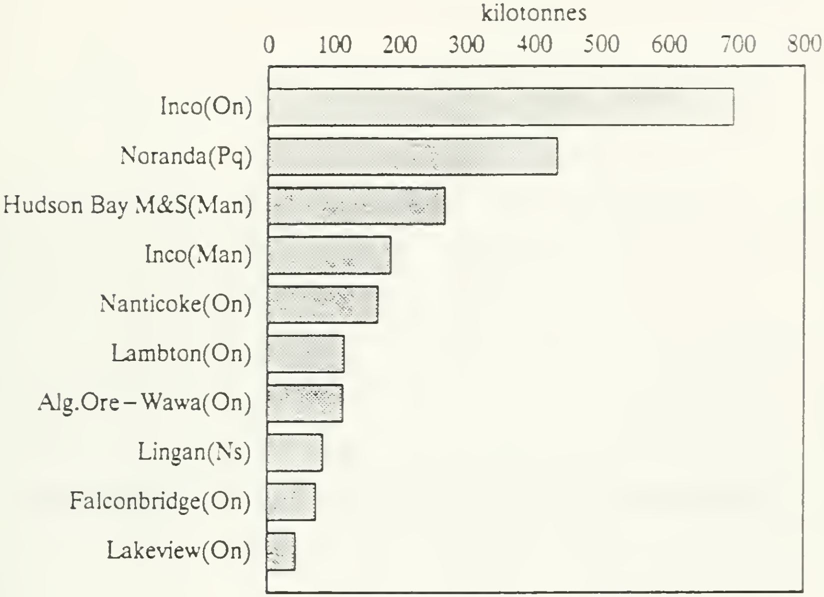
Rank	NAME	PROVINCE	(Tonnes)	CANADA Percent
1	Inco	Ontario	695,000	18.8%
2	Noranda	Quebec	436,000	11.8%
3	Hudson Bay M&S	Manitoba	270,000	7.3%
4	Inco	Manitoba	188,000	5.1%
5	Nanticoke Gs	Ontario	169,000	4.6%
6	Lambton Gs	Ontario	118,000	3.2%
7	Algoma Ore - Wawa	Ontario	115,890	3.1%
8	Lingan	Nova Scotia	85,000	2.3%
9	Falconbridge	Ontario	74,352	2.0%
10	Lakeview Gs	Ontario	43,800	1.2%
	TOTAL OF 10 MAJOR SOURCES :		2,195,042	59.3%

*** CANADA TOTAL: 3,703,612

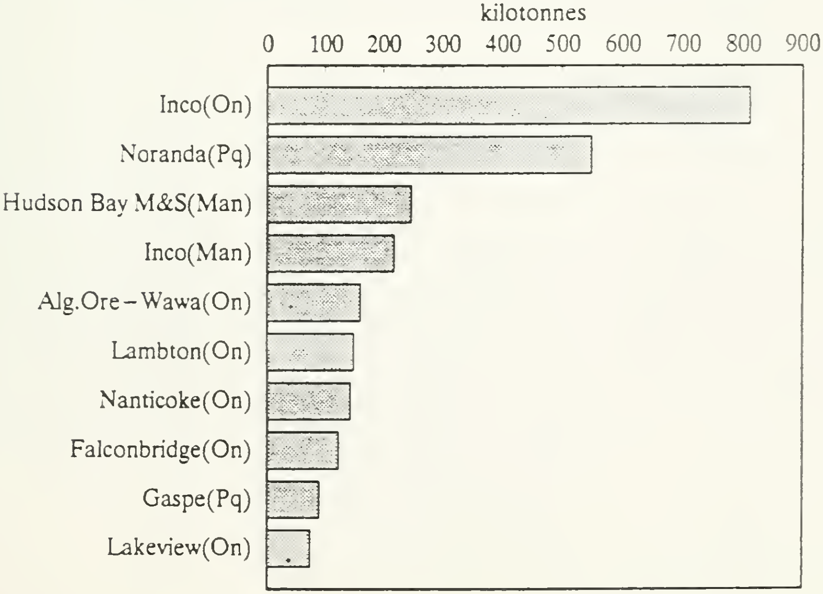
SOURCES: - Ontario: MOE
- Other provinces: C & P estimates, April 1988

MOE/ARB/AQM/EI
Aug-90

EMISSIONS from CANADA MAJOR SO2 POINT SOURCES in 1985



EMISSIONS from CANADA MAJOR SO2 POINT SOURCES in 1980



SECTION C: UNITED STATES EMISSIONS

1980-1988 SO2 EMISSION TREND IN THE UNITED STATES

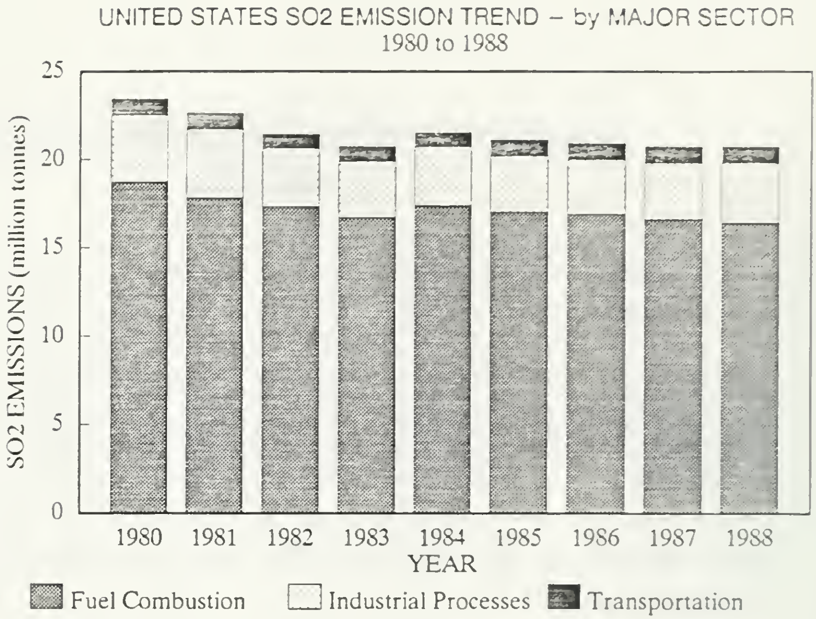
(Million Tonnes)

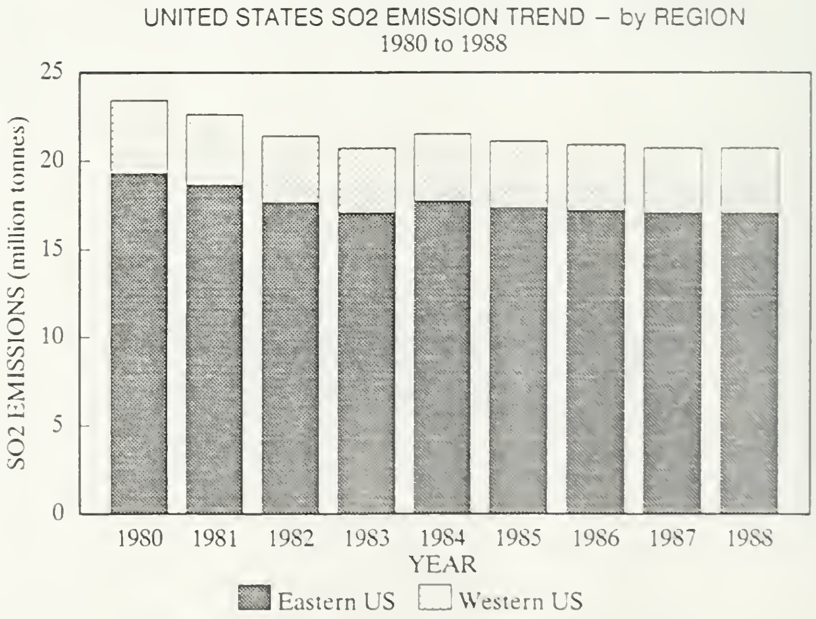
SOURCE CATEGORY	80	81	82	83	84	85	86	87	88
TRANSPORTATION	0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.9
FUEL COMBUSTION	18.7	17.8	17.3	16.7	17.4	17.0	16.9	16.6	16.4
INDUSTRIAL PROCESSES	3.8	3.9	3.3	3.2	3.3	3.2	3.1	3.2	3.4
SOLID WASTE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNITED STATES TOTAL	**23.4**	**22.6**	**21.4**	**20.7**	**21.5**	**21.1**	**20.9**	**20.6**	**20.7**
BREAKDOWN BY REGION									
EASTERN US	19.3	18.6	17.6	17.1	17.7	17.3	17.2	16.9	17.0
WESTERN US	4.1	4.0	3.8	3.6	3.8	3.8	3.7	3.7	3.7

Source: "National Air Quality and Emission Trend Report, 1988",
EPA-450/4-90-002, March 1990.

Note:
- The sum of sub-categories may not equal total due to rounding.
- 1980 SO2 regional ratio was assumed for 1981 to 1984, 1985 SO2 regional ratio was assumed for 1986 to 1988.
- National total from NAPAP for 1980 and 1985 is 24.4 and 21.0 million metric tons respectively.

MOE/ARB/AQM/EI
Aug-90


UNITED STATES SO2 EMISSION TREND – by MAJOR SECTOR
1980 to 1988
SO2 EMISSIONS (million tonnes)
0
5
10
15
20
25
1980
1981
1982
1983
1984
1985
1986
1987
1988
YEAR
Fuel Combustion
Industrial Processes
Transportation


UNITED STATES SO2 EMISSION TREND – by REGION
1980 to 1988
SO2 EMISSIONS (million tonnes)
0
5
10
15
20
25
1980
1981
1982
1983
1984
1985
1986
1987
1988
YEAR
Eastern US
Western US

1980-1988 NOx EMISSION TREND IN THE UNITED STATES

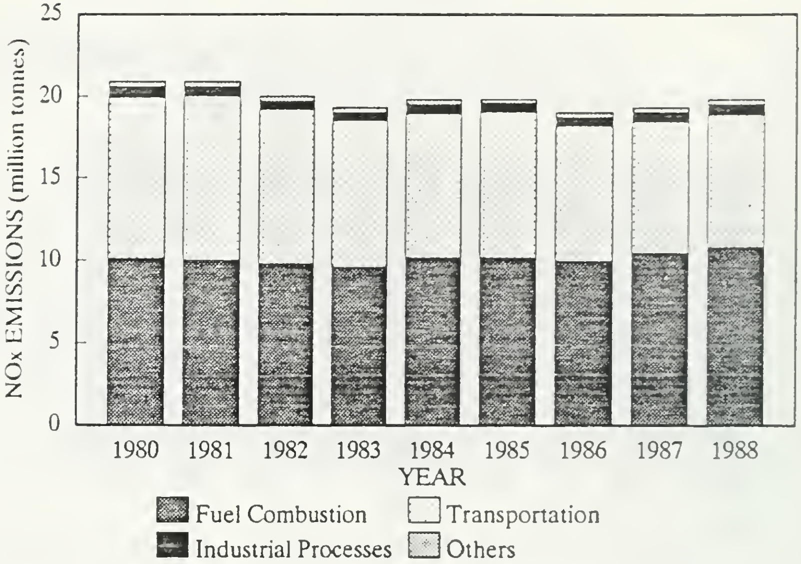
(Million Tonnes)

SOURCE CATEGORY	80	81	82	83	84	85	86	87	88
TRANSPORTATION	9.8	10.0	9.4	8.9	8.8	8.9	8.3	8.0	8.1
FUEL COMBUSTION	10.1	10.0	9.8	9.6	10.2	10.2	10.0	10.5	10.8
INDUSTRIAL PROCESSES	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6
SOLID WASTE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MISCELLANEOUS	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2
UNITED STATES TOTAL	20.9	20.9	20.0	19.3	19.8	19.8	19.0	19.3	19.8
BREAKDOWN BY REGION									
EASTERN US	13.3	13.3	12.8	12.3	12.6	13.0	12.5	12.7	13.0
WESTERN US	7.6	7.6	7.2	7.0	7.2	6.8	6.5	6.6	6.8

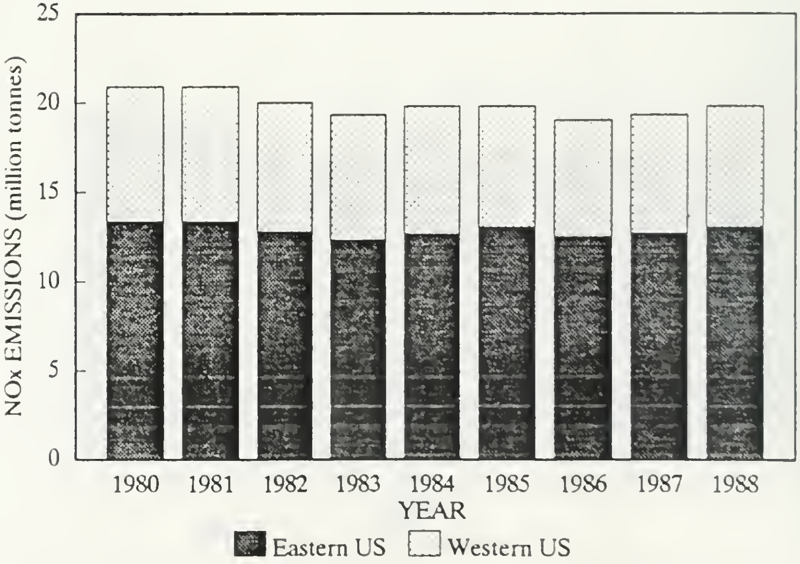
Source: "National Air Quality and Emission Trend Report, 1988",
EPA-450/4-90-002, March 1990.

Notes:
- The sum of sub-categories may not equal total due to rounding.
- 1980 NOx regional ratio was assumed for 1981 to 1984,
  1985 NOx regional ratio was assumed for 1986 to 1988.
- National total from NAPAP for 1980 and 1985 is 20.4 and 18.6 million metric tons respectively.

UNITED STATES NOx EMISSION TREND – by MAJOR SECTOR
1980 to 1988



UNITED STATE NOx EMISSION TREND – by REGION
1980 to 1988



1980-1988 VOC EMISSION TREND IN THE UNITED STATES

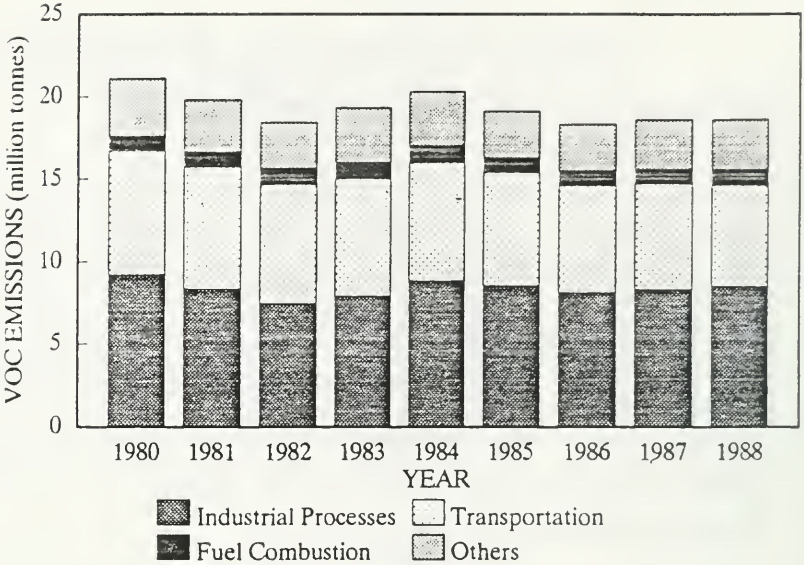
(Million Tonnes)

SOURCE CATEGORY	80	81	82	83	84	85	86	87	88
TRANSPORTATION	7.5	7.4	7.2	7.1	7.2	6.9	6.5	6.4	6.1
FUEL COMBUSTION	0.9	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.9
INDUSTRIAL PROCESSES	9.2	8.3	7.5	7.9	8.8	8.5	8.1	8.3	8.5
SOLID WASTE	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
MISCELLANEOUS	2.9	2.5	2.2	2.7	2.7	2.2	2.2	2.4	2.4
UNITED STATES TOTAL	21.1	19.8	18.4	19.3	20.3	19.1	18.3	18.6	18.6
BREAKDOWN BY REGION									
EASTERN US	13.0	12.2	11.3	11.9	12.5	12.6	12.1	12.3	12.2
WESTERN US	8.1	7.6	7.1	7.4	7.8	6.5	6.2	6.3	6.3

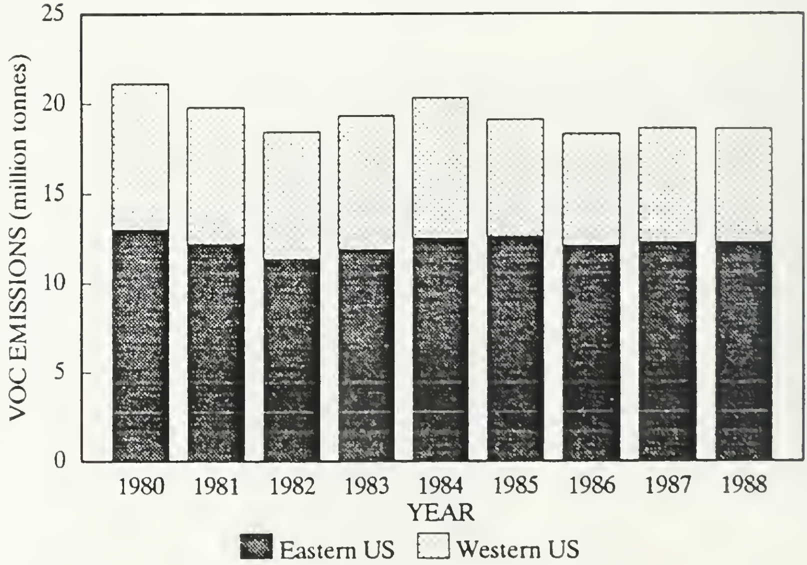
Source: "National Air Quality and Emission Trend Report, 1988", EPA-450/4-90-002, March 1990.

Notes:
- The sum of sub-categories may not equal total due to rounding.
- 1980 VOC regional ratio was assumed for 1981 to 1984, 1985 VOC regional ratio was assumed for 1986 to 1988.
- National total from NAPAP for 1980 and 1985 is 16.9 and 20.0 million metric tons respectively.

UNITED STATES VOC EMISSION TREND – by MAJOR SECTOR
1980 to 1988



UNITED STATE VOC EMISSION TREND – by REGION
1980 to 1988



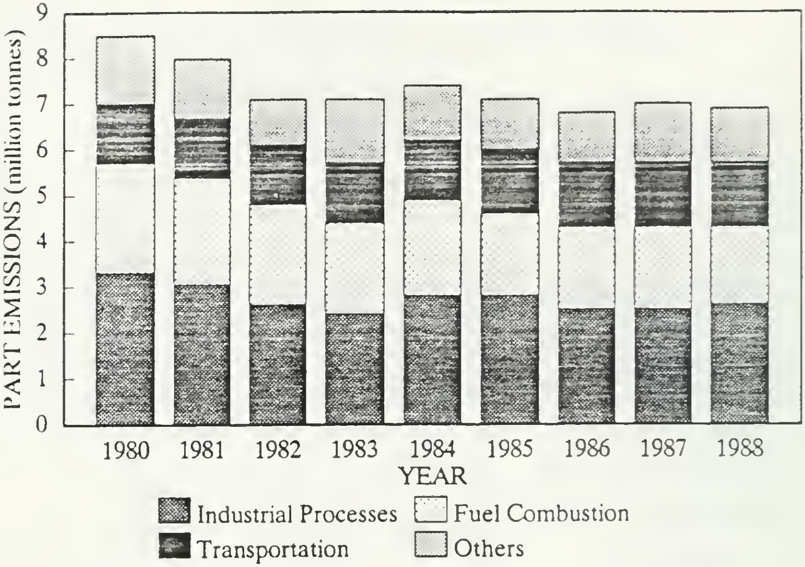
1980-1988 PARTICULATE EMISSION TREND IN THE UNITED STATES

(Million Tonnes)

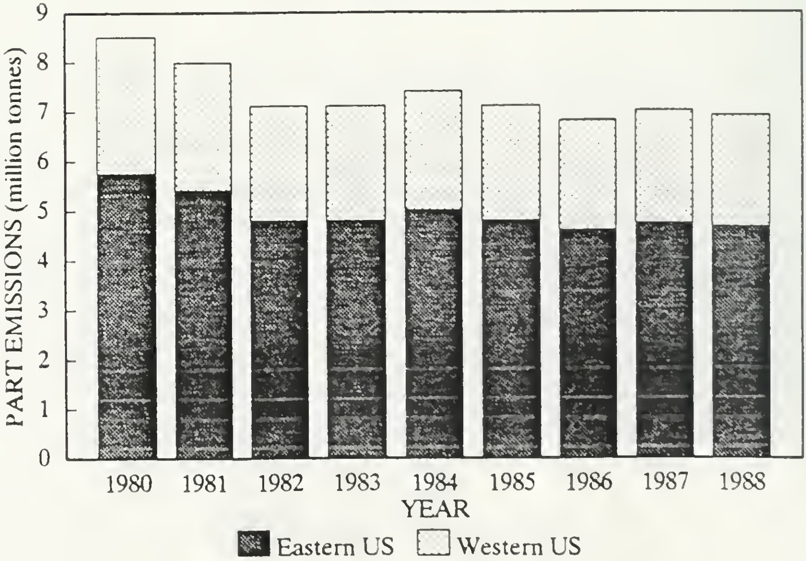
SOURCE CATEGORY	80	81	82	83	84	85	86	87	88
TRANSPORTATION	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4
FUEL COMBUSTION	2.4	2.3	2.2	2.0	2.1	1.8	1.8	1.8	1.7
INDUSTRIAL PROCESSES	3.3	3.0	2.6	2.4	2.8	2.8	2.5	2.5	2.6
SOLID WASTE	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
MISCELLANEOUS	1.1	0.9	0.7	1.1	0.9	0.8	0.8	1.0	0.9
UNITED STATES TOTAL	8.5	8.0	7.1	7.1	7.4	7.1	6.8	7.0	6.9
BREAKDOWN BY REGION									
EASTERN US	5.7	5.4	4.8	4.8	5.0	4.8	4.6	4.7	4.7
WESTERN US	2.8	2.6	2.3	2.3	2.4	2.3	2.2	2.3	2.2

Source: "National Air Quality and Emission Trend Report, 1988",
EPA-450/4-90-002, March 1990.

Notes:
- The sum of sub-categories may not equal total due to rounding.
- Natural and open sources are not included.
- 1985 Part regional ratio was assumed for 1980 to 1988.
- National total from NAPAP for 1985 is 7.6 million metric tons. (EPA-600/7-89-012a, Nov. 1989)



UNITED STATES PART EMISSION TREND – by MAJOR SECTOR
1980 to 1988



UNITED STATE PART EMISSION TREND – by REGION
1980 to 1988

1980-1988 CO EMISSION TREND IN THE UNITED STATES

(Million Tonnes)

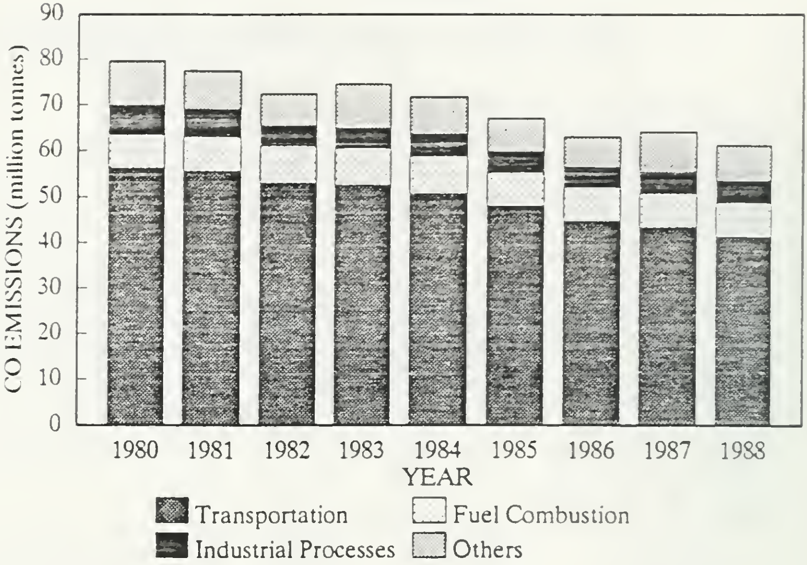
SOURCE CATEGORY	80	81	82	83	84	85	86	87	88
TRANSPORTATION	56.1	55.4	52.9	52.4	50.6	47.9	44.6	43.2	41.2
FUEL COMBUSTION	7.4	7.7	8.2	8.2	8.3	7.4	7.5	7.6	7.6
INDUSTRIAL PROCESSES	6.3	5.9	4.3	4.3	4.7	4.4	4.3	4.5	4.7
SOLID WASTE	2.2	2.1	2.0	1.9	1.9	2.0	1.7	1.7	1.7
MISCELLANEOUS	7.6	6.4	4.9	7.7	6.3	5.3	5.0	7.1	6.0
UNITED STATES TOTAL	79.6	77.4	72.4	74.5	71.8	67.0	63.1	64.1	61.2
BREAKDOWN BY REGION									
EASTERN US	50.6	49.2	46.0	47.4	45.7	43.2	40.7	41.3	39.5
WESTERN US	29.0	28.2	26.3	27.1	26.1	23.8	22.4	22.8	21.7

Source: "National Air Quality and Emission Trend Report, 1988",
EPA-450/4-90-002, March 1990.

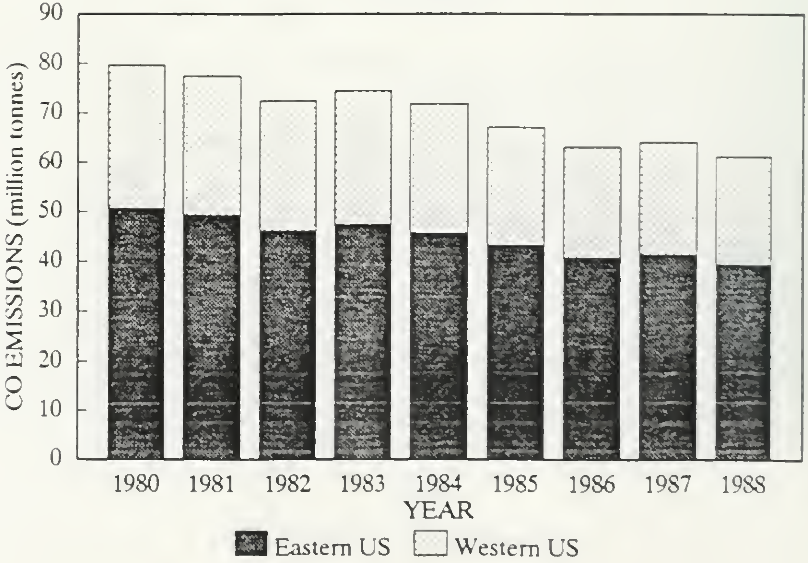
Notes:
- The sum of sub-categories may not equal total due to rounding.
- 1980 CO regional ratio was assumed for 1981 to 1984,
  1985 CO regional ratio was assumed for 1986 to 1988.
- National total from NAPAP for 1980 and 1985 is 90.0 and 55.3 million metric tons respectively.

MOE/ARB/AQM/E1
Aug-90

UNITED STATES CO EMISSION TREND – by MAJOR SECTOR
1980 to 1988



UNITED STATE CO EMISSION TREND – by REGION
1980 to 1988



1980 US SO2 EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	SO2	%	Rk	WESTERN STATES	SO2	%	Rk
ALABAMA	778	3.2%	13	ARIZONA	766	3.1%	14
ARKANSAS	79	0.3%	41	CALIFORNIA	471	1.9%	18
CONNECTICUT	58	0.2%	43	COLORADO	127	0.5%	34
DELAWARE	113	0.5%	36	IDAHO	51	0.2%	44
DIST. COLUMBIA	14	0.1%	47	KANSAS	207	0.8%	30
FLORIDA	1,000	4.1%	10	MONTANA	154	0.6%	32
GEORGIA	816	3.3%	11	NEBRASKA	71	0.3%	42
ILLINOIS	1,328	5.4%	4	NEVADA	134	0.5%	33
INDIANA	1,788	7.3%	2	NEW MEXICO	238	1.0%	28
IOWA	303	1.2%	23	NORTH DAKOTA	105	0.4%	38
KENTUCKY	1,043	4.3%	8	OKLAHOMA	95	0.4%	40
LOUISIANA	364	1.5%	19	OREGON	51	0.2%	45
MAINE	121	0.5%	35	SOUTH DAKOTA	37	0.2%	46
MARYLAND	275	1.1%	27	TEXAS	1,201	4.9%	6
MASSACHUSETTS	325	1.3%	21	UTAH	106	0.4%	37
MICHIGAN	763	3.1%	15	WASHINGTON	288	1.2%	24
MINNESOTA	217	0.9%	29	WYOMING	192	0.8%	31
MISSISSIPPI	276	1.1%	26				
MISSOURI	1,209	4.9%	5				
NEW HAMPSHIRE	98	0.4%	39				
NEW JERSEY	282	1.2%	25				
NEW YORK	789	3.2%	12				
NORTH CAROLINA	595	2.4%	17				
OHIO	2,432	9.9%	1				
PENNSYLVANIA	1,722	7.0%	3				
RHODE ISLAND	13	0.1%	48				
SOUTH CAROLINA	313	1.3%	22				
TENNESSEE	1,050	4.3%	7				
VERMONT	9	0.0%	49				
VIRGINIA	336	1.4%	20				
WEST VIRGINIA	1,039	4.2%	9				
WISCONSIN	608	2.5%	16				

EASTERN SUBTOTAL: 20,156 82.4% US

WESTERN SUBTOTAL: 4,292 17.6% US

UNITED STATES SO2 TOTAL: 24,448 KILOTONNES

Source: NAPAP version 5.0 for Area sources, 5.2 for Point sources
from tapes provided by MEP, 1989.

1980 US NOx EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	NOx	%	Rk	WESTERN STATES	NOx	%	Rk
ALABAMA	442	2.2%	18	ARIZONA	239	1.2%	30
ARKANSAS	192	0.9%	35	CALIFORNIA	1,252	6.1%	2
CONNECTICUT	127	0.6%	39	COLORADO	276	1.4%	25
DELAWARE	57	0.3%	45	IDAHO	83	0.4%	42
DIST. COLUMBIA	23	0.1%	49	KANSAS	465	2.3%	17
FLORIDA	646	3.2%	9	MONTANA	127	0.6%	38
GEORGIA	535	2.6%	11	NEBRASKA	157	0.8%	36
ILLINOIS	883	4.3%	5	NEVADA	88	0.4%	41
INDIANA	714	3.5%	6	NEW MEXICO	230	1.1%	32
IOWA	277	1.4%	24	NORTH DAKOTA	123	0.6%	40
KENTUCKY	500	2.5%	12	OKLAHOMA	411	2.0%	20
LOUISIANA	643	3.2%	10	OREGON	206	1.0%	34
MAINE	61	0.3%	44	SOUTH DAKOTA	72	0.4%	43
MARYLAND	237	1.2%	31	TEXAS	3,020	14.8%	1
MASSACHUSETTS	246	1.2%	29	UTAH	141	0.7%	37
MICHIGAN	649	3.2%	8	WASHINGTON	267	1.3%	26
MINNESOTA	332	1.6%	23	WYOMING	226	1.1%	33
MISSISSIPPI	267	1.3%	27				
MISSOURI	499	2.4%	13				
NEW HAMPSHIRE	54	0.3%	46				
NEW JERSEY	491	2.4%	14				
NEW YORK	668	3.3%	7				
NORTH CAROLINA	483	2.4%	15				
OHIO	1,104	5.4%	3				
PENNSYLVANIA	944	4.6%	4				
RHODE ISLAND	33	0.2%	48				
SOUTH CAROLINA	252	1.2%	28				
TENNESSEE	482	2.4%	16				
VERMONT	40	0.2%	47				
VIRGINIA	348	1.7%	22				
WEST VIRGINIA	418	2.0%	19				
WISCONSIN	370	1.8%	21				

EASTERN SUBTOTAL: 13,014 63.8% US

WESTERN SUBTOTAL: 7,384 36.2% US

UNITED STATES NOx TOTAL: 20,397 KILOTONNES

Source: NAPAP version 5.0 for Area sources, 5.2 for Point sources
from tapes provided by MEP, 1989.

1980 US VOC EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	VOC	%	Rk	WESTERN STATES	VOC	%	Rk
ALABAMA	300	1.8%	23	ARIZONA	195	1.2%	31
ARKANSAS	160	0.9%	35	CALIFORNIA	1,651	9.8%	2
CONNECTICUT	162	1.0%	34	COLORADO	280	1.7%	24
DELAWARE	55	0.3%	44	IDAHO	182	1.1%	32
DIST. COLUMBIA	34	0.2%	48	KANSAS	256	1.5%	26
FLORIDA	599	3.6%	7	MONTANA	197	1.2%	30
GEORGIA	358	2.1%	16	NEBRASKA	137	0.8%	37
ILLINOIS	688	4.1%	3	NEVADA	72	0.4%	42
INDIANA	381	2.3%	13	NEW MEXICO	155	0.9%	36
IOWA	181	1.1%	33	NORTH DAKOTA	41	0.2%	47
KENTUCKY	318	1.9%	20	OKLAHOMA	268	1.6%	25
LOUISIANA	505	3.0%	9	OREGON	252	1.5%	27
MAINE	65	0.4%	43	SOUTH DAKOTA	79	0.5%	41
MARYLAND	248	1.5%	28	TEXAS	2,169	12.9%	1
MASSACHUSETTS	351	2.1%	17	UTAH	128	0.8%	38
MICHIGAN	628	3.7%	6	WASHINGTON	342	2.0%	19
MINNESOTA	312	1.9%	21	WYOMING	95	0.6%	40
MISSISSIPPI	208	1.2%	29				
MISSOURI	442	2.6%	10				
NEW HAMPSHIRE	53	0.3%	45				
NEW JERSEY	425	2.5%	11				
NEW YORK	581	3.4%	8				
NORTH CAROLINA	389	2.3%	12				
OHIO	669	4.0%	5				
PENNSYLVANIA	684	4.1%	4				
RHODE ISLAND	51	0.3%	46				
SOUTH CAROLINA	372	2.2%	15				
TENNESSEE	378	2.2%	14				
VERMONT	28	0.2%	49				
VIRGINIA	345	2.0%	18				
WEST VIRGINIA	99	0.6%	39				
WISCONSIN	303	1.8%	22				

EASTERN SUBTOTAL: 10,370 61.5% US

WESTERN SUBTOTAL: 6,498 38.5% US

UNITED STATES VOC TOTAL: 16,869 KILOTONNES

Source: NAPAP version 5.0 for Area sources, 5.2 for Point sources
from tapes provided by MEP, 1989.

1980 US PARTICULATES EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	PART(*)	%	Rk	WESTERN STATES	PART(*)	%	Rk
ALABAMA	398	1.0%	36	ARIZONA	755	2.0%	22
ARKANSAS	793	2.1%	21	CALIFORNIA	1,389	3.6%	5
CONNECTICUT	109	0.3%	44	COLORADO	1,028	2.7%	11
DELAWARE	45	0.1%	47	IDAHO	299	0.8%	40
DIST. COLUMBIA	14	0.0%	49	KANSAS	1,679	4.3%	3
FLORIDA	834	2.2%	16	MONTANA	798	2.1%	19
GEORGIA	799	2.1%	18	NEBRASKA	980	2.5%	13
ILLINOIS	846	2.2%	15	NEVADA	834	2.2%	17
INDIANA	450	1.2%	31	NEW MEXICO	1,131	2.9%	8
IOWA	1,122	2.9%	9	NORTH DAKOTA	1,174	3.0%	7
KENTUCKY	410	1.1%	34	OKLAHOMA	1,004	2.6%	12
LOUISIANA	507	1.3%	30	OREGON	1,672	4.3%	4
MAINE	115	0.3%	43	SOUTH DAKOTA	649	1.7%	24
MARYLAND	206	0.5%	41	TEXAS	5,381	13.9%	1
MASSACHUSETTS	191	0.5%	42	UTAH	626	1.6%	27
MICHIGAN	798	2.1%	20	WASHINGTON	315	0.8%	39
MINNESOTA	1,087	2.8%	10	WYOMING	440	1.1%	32
MISSISSIPPI	532	1.4%	29				
MISSOURI	2,609	6.8%	2				
NEW HAMPSHIRE	60	0.2%	46				
NEW JERSEY	365	0.9%	37				
NEW YORK	727	1.9%	23				
NORTH CAROLINA	635	1.6%	26				
OHIO	970	2.5%	14				
PENNSYLVANIA	1,299	3.4%	6				
RHODE ISLAND	29	0.1%	48				
SOUTH CAROLINA	409	1.1%	35				
TENNESSEE	595	1.5%	28				
VERMONT	93	0.2%	45				
VIRGINIA	423	1.1%	33				
WEST VIRGINIA	346	0.9%	38				
WISCONSIN	640	1.7%	25				

(*) Note: includes natural sources.

EASTERN SUBTOTAL: 18,456 47.8% US

WESTERN SUBTOTAL: 20,153 52.2% US

U.S. PARTICULATES TOTAL: 38,609 KILOTONNES

Source: NAPAP version 5.0 for Area sources, 5.2 for Point sources
from tapes provided by MEP, 1989

1980 US CO EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	CO	%	Rk	WESTERN STATES	CO	%	Rk
ALABAMA	1,642	1.8%	23	ARIZONA	1,181	1.3%	28
ARKANSAS	948	1.1%	34	CALIFORNIA	8,621	9.6%	1
CONNECTICUT	1,081	1.2%	31	COLORADO	2,087	2.3%	14
DELAWARE	220	0.2%	48	IDAHO	1,160	1.3%	29
DIST. COLUMBIA	307	0.3%	45	KANSAS	972	1.1%	33
FLORIDA	3,691	4.1%	7	MONTANA	1,289	1.4%	27
GEORGIA	2,114	2.3%	12	NEBRASKA	553	0.6%	39
ILLINOIS	3,852	4.3%	6	NEVADA	472	0.5%	41
INDIANA	2,152	2.4%	11	NEW MEXICO	845	0.9%	37
IOWA	1,003	1.1%	32	NORTH DAKOTA	256	0.3%	47
KENTUCKY	1,445	1.6%	24	OKLAHOMA	1,681	1.9%	22
LOUISIANA	2,305	2.6%	9	OREGON	1,317	1.5%	26
MAINE	459	0.5%	43	SOUTH DAKOTA	462	0.5%	42
MARYLAND	1,323	1.5%	25	TEXAS	8,217	9.1%	2
MASSACHUSETTS	1,943	2.2%	18	UTAH	898	1.0%	36
MICHIGAN	3,275	3.6%	8	WASHINGTON	2,178	2.4%	10
MINNESOTA	1,748	1.9%	20	WYOMING	535	0.6%	40
MISSISSIPPI	899	1.0%	35				
MISSOURI	2,000	2.2%	17				
NEW HAMPSHIRE	320	0.4%	44				
NEW JERSEY	2,080	2.3%	15				
NEW YORK	4,313	4.8%	3				
NORTH CAROLINA	2,074	2.3%	16				
OHIO	4,255	4.7%	4				
PENNSYLVANIA	3,969	4.4%	5				
RHODE ISLAND	287	0.3%	46				
SOUTH CAROLINA	1,095	1.2%	30				
TENNESSEE	1,769	2.0%	19				
VERMONT	189	0.2%	49				
VIRGINIA	2,106	2.3%	13				
WEST VIRGINIA	712	0.8%	38				
WISCONSIN	1,714	1.9%	21				

EASTERN SUBTOTAL: 57,287 63.6% US WESTERN SUBTOTAL: 32,724 36.4% US

UNITED STATES CO TOTAL: 90,011 KILOTONNES

Source: NAPAP version 5.0 for Area sources, 5.2 for Point sources
from tapes provided by MEP, 1989.

1985 US SO2 EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	SO2	%	Rk	WESTERN STATES	SO2	%	Rk
ALABAMA	657	3.1%	11	ARIZONA	651	3.1%	12
ARKANSAS	99	0.5%	35	CALIFORNIA	206	1.0%	25
CONNECTICUT	79	0.4%	38	COLORADO	84	0.4%	36
DELAWARE	107	0.5%	34	IDAHO	33	0.2%	46
DIST. COLUMBIA	7	0.0%	48	KANSAS	144	0.7%	32
FLORIDA	598	2.8%	14	MONTANA	83	0.4%	37
GEORGIA	1,009	4.8%	7	NEBRASKA	58	0.3%	42
ILLINOIS	1,262	6.0%	5	NEVADA	37	0.2%	45
INDIANA	1,758	8.4%	2	NEW MEXICO	246	1.2%	23
IOWA	262	1.2%	22	NORTH DAKOTA	200	1.0%	26
KENTUCKY	797	3.8%	10	OKLAHOMA	136	0.6%	33
LOUISIANA	365	1.7%	18	OREGON	40	0.2%	43
MAINE	72	0.3%	40	SOUTH DAKOTA	39	0.2%	44
MARYLAND	280	1.3%	21	TEXAS	1,366	6.5%	3
MASSACHUSETTS	308	1.5%	19	UTAH	65	0.3%	41
MICHIGAN	500	2.4%	15	WASHINGTON	153	0.7%	30
MINNESOTA	151	0.7%	31	WYOMING	187	0.9%	27
MISSISSIPPI	158	0.8%	29				
MISSOURI	1,069	5.1%	6				
NEW HAMPSHIRE	77	0.4%	39				
NEW JERSEY	166	0.8%	28				
NEW YORK	604	2.9%	13				
NORTH CAROLINA	439	2.1%	17				
OHIO	2,323	11.1%	1				
PENNSYLVANIA	1,296	6.2%	4				
RHODE ISLAND	8	0.0%	47				
SOUTH CAROLINA	215	1.0%	24				
TENNESSEE	887	4.2%	9				
VERMONT	7	0.0%	49				
VIRGINIA	283	1.3%	20				
WEST VIRGINIA	960	4.6%	8				
WISCONSIN	467	2.2%	16				

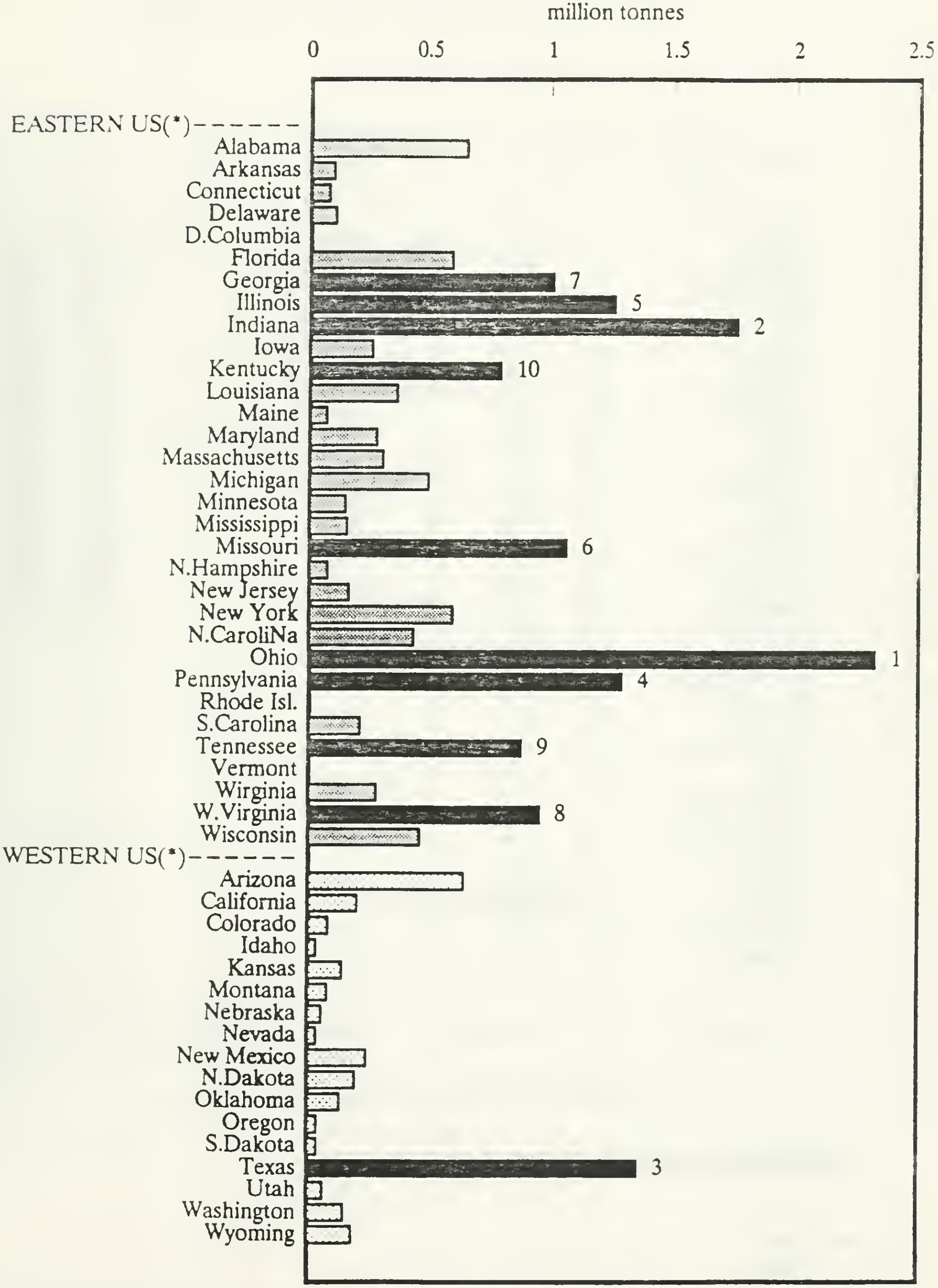
EASTERN SUBTOTAL: 17,270 82.2% US

WESTERN SUBTOTAL: 3,728 17.8% US

UNITED STATES SO2 TOTAL: 20,998 KILOTONNES

Source: 1985 NAPAP Emission Inventory Report, EPA-600/7-89-012a, Nov. 1989

1985 UNITED STATES SO2 EMISSIONS BY REGION & STATE



(*) Solid columns: top 10 states.

1985 US NOx EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	NOx	%	Rk	WESTERN STATES	NOx	%	Rk
ALABAMA	417	2.2%	16	ARIZONA	225	1.2%	31
ARKANSAS	216	1.2%	32	CALIFORNIA	1,129	6.1%	2
CONNECTICUT	116	0.6%	40	COLORADO	266	1.4%	24
DELAWARE	62	0.3%	44	IDAHO	80	0.4%	42
DIST. COLUMBIA	18	0.1%	49	KANSAS	384	2.1%	18
FLORIDA	617	3.3%	8	MONTANA	141	0.8%	39
GEORGIA	533	2.9%	11	NEBRASKA	149	0.8%	38
ILLINOIS	879	4.7%	4	NEVADA	102	0.5%	41
INDIANA	803	4.3%	6	NEW MEXICO	257	1.4%	25
IOWA	242	1.3%	29	NORTH DAKOTA	168	0.9%	35
KENTUCKY	472	2.5%	13	OKLAHOMA	361	1.9%	19
LOUISIANA	692	3.7%	7	OREGON	154	0.8%	37
MAINE	61	0.3%	45	SOUTH DAKOTA	66	0.4%	43
MARYLAND	256	1.4%	26	TEXAS	2,279	12.2%	1
MASSACHUSETTS	248	1.3%	28	UTAH	155	0.8%	36
MICHIGAN	595	3.2%	9	WASHINGTON	249	1.3%	27
MINNESOTA	322	1.7%	22	WYOMING	203	1.1%	34
MISSISSIPPI	215	1.2%	33				
MISSOURI	486	2.6%	12				
NEW HAMPSHIRE	50	0.3%	46				
NEW JERSEY	323	1.7%	21				
NEW YORK	570	3.1%	10				
NORTH CAROLINA	455	2.4%	15				
OHIO	922	4.9%	3				
PENNSYLVANIA	867	4.7%	5				
RHODE ISLAND	27	0.1%	47				
SOUTH CAROLINA	234	1.3%	30				
TENNESSEE	461	2.5%	14				
VERMONT	23	0.1%	48				
VIRGINIA	353	1.9%	20				
WEST VIRGINIA	414	2.2%	17				
WISCONSIN	316	1.7%	23				

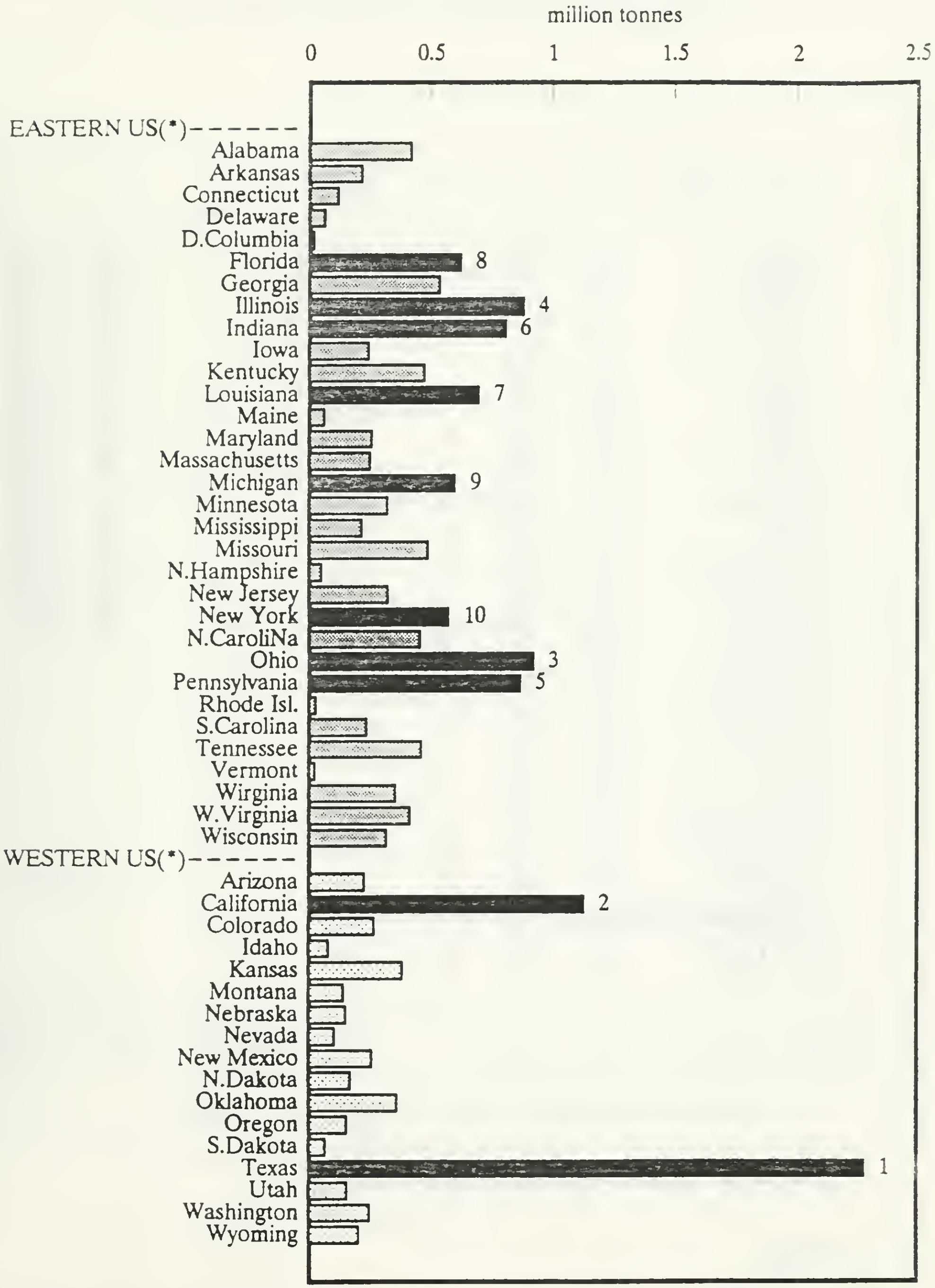
EASTERN SUBTOTAL: 12,267 65.8% US

WESTERN SUBTOTAL: 6,367 34.2% US

UNITED STATES NOx TOTAL: 18,635 KILOTONNES

Source: 1985 NAPAP Emission Inventory Report, EPA-600/7-89-012a, Nov. 1989

1985 UNITED STATES NOx EMISSIONS BY REGION & STATE



(*) Solid columns: top 10 states.

1985 US VOC EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

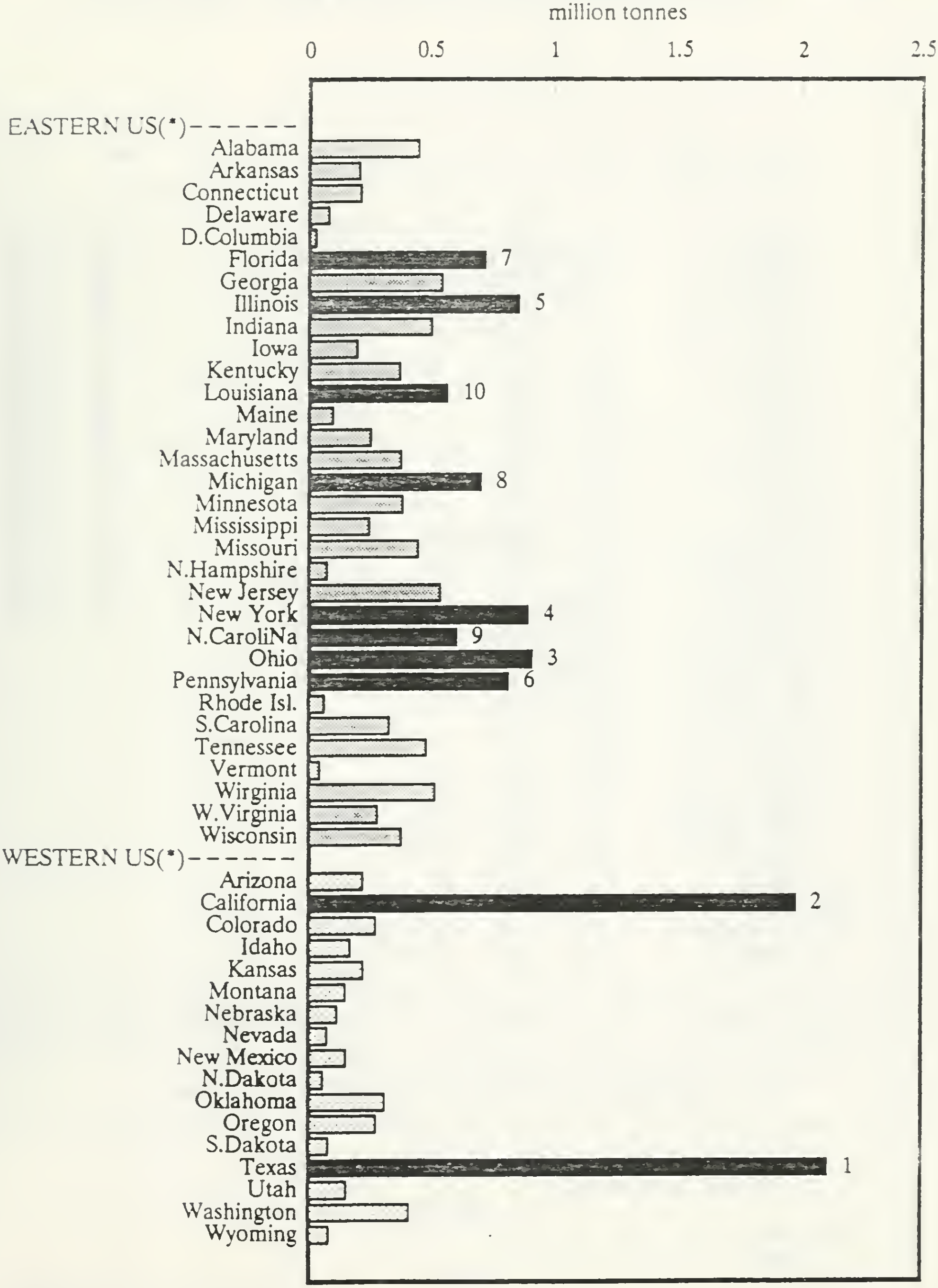
EASTERN STATES	VOC	%	Rk	WESTERN STATES	VOC	%	Rk
ALABAMA	451	2.3%	16	ARIZONA	218	1.1%	31
ARKANSAS	203	1.0%	33	CALIFORNIA	1,982	9.9%	2
CONNECTICUT	210	1.0%	32	COLORADO	273	1.4%	27
DELAWARE	79	0.4%	42	IDAHO	168	0.8%	35
DIST. COLUMBIA	27	0.1%	49	KANSAS	221	1.1%	30
FLORIDA	723	3.6%	7	MONTANA	148	0.7%	38
GEORGIA	548	2.7%	11	NEBRASKA	115	0.6%	39
ILLINOIS	859	4.3%	5	NEVADA	74	0.4%	45
INDIANA	505	2.5%	14	NEW MEXICO	149	0.7%	37
IOWA	194	1.0%	34	NORTH DAKOTA	56	0.3%	47
KENTUCKY	372	1.9%	22	OKLAHOMA	311	1.6%	24
LOUISIANA	568	2.8%	10	OREGON	274	1.4%	26
MAINE	95	0.5%	40	SOUTH DAKOTA	79	0.4%	43
MARYLAND	251	1.3%	28	TEXAS	2,113	10.6%	1
MASSACHUSETTS	378	1.9%	21	UTAH	153	0.8%	36
MICHIGAN	706	3.5%	8	WASHINGTON	413	2.1%	18
MINNESOTA	384	1.9%	19	WYOMING	80	0.4%	41
MISSISSIPPI	245	1.2%	29				
MISSOURI	448	2.2%	17				
NEW HAMPSHIRE	74	0.4%	44				
NEW JERSEY	540	2.7%	12				
NEW YORK	897	4.5%	4				
NORTH CAROLINA	607	3.0%	9				
OHIO	914	4.6%	3				
PENNSYLVANIA	820	4.1%	6				
RHODE ISLAND	61	0.3%	46				
SOUTH CAROLINA	329	1.6%	23				
TENNESSEE	485	2.4%	15				
VERMONT	44	0.2%	48				
VIRGINIA	519	2.6%	13				
WEST VIRGINIA	279	1.4%	25				
WISCONSIN	381	1.9%	20				

EASTERN SUBTOTAL: 13,197 65.9% US WESTERN SUBTOTAL: 6,827 34.1% US

UNITED STATES VOC TOTAL: 20,024 KILOTONNES

Source: 1985 NAPAP Emission Inventory Report, EPA-600/7-89-012a, Nov. 1989

1985 UNITED STATES VOC EMISSIONS BY REGION & STATE



(*) Solid columns: top 10 states.

1985 US PARTICULATES EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

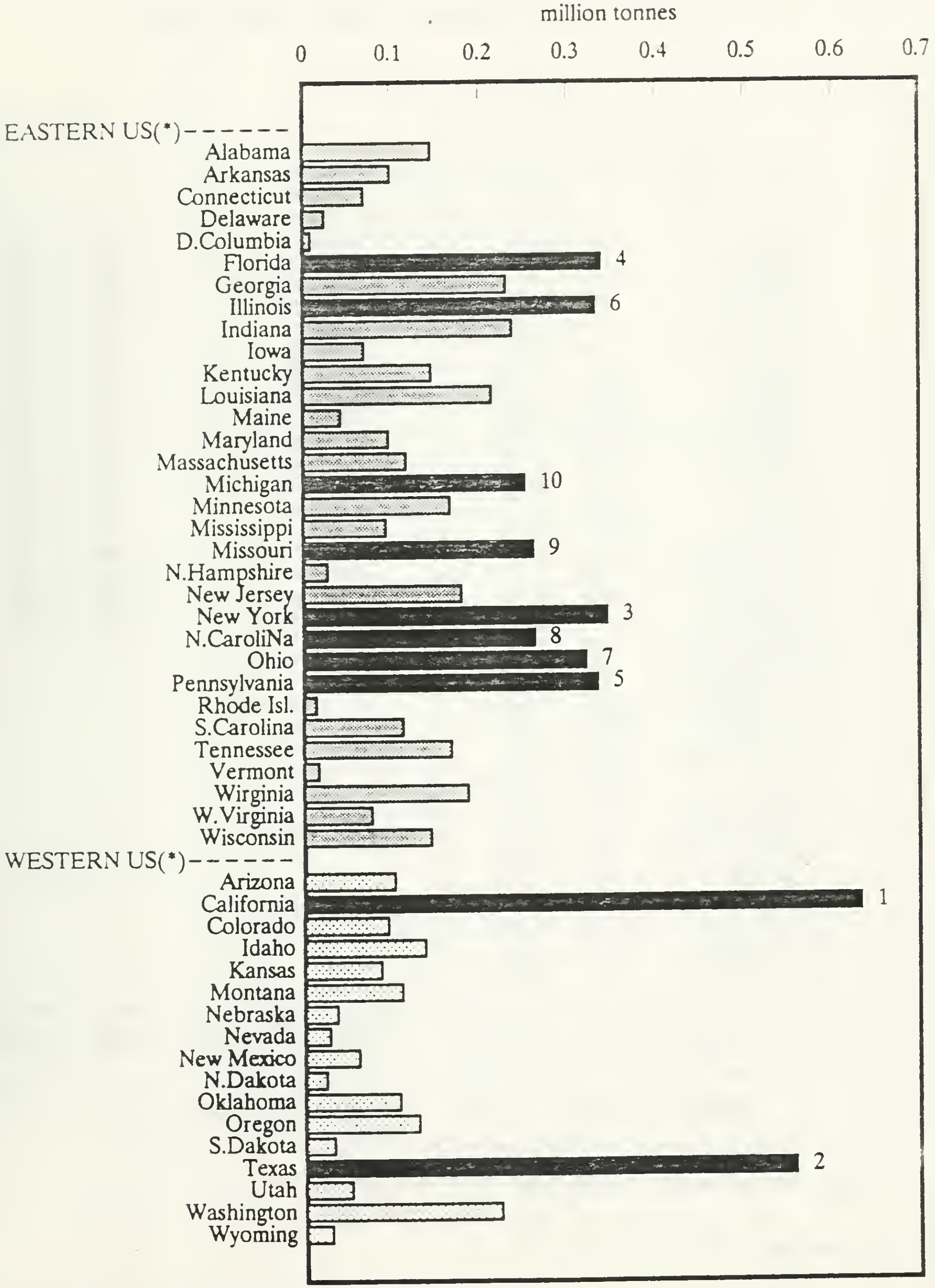
EASTERN STATES	PART	%	Rk	WESTERN STATES	PART	%	Rk
ALABAMA	147	1.9%	19	ARIZONA	104	1.4%	28
ARKANSAS	101	1.3%	29	CALIFORNIA	632	8.3%	1
CONNECTICUT	70	0.9%	35	COLORADO	96	1.3%	31
DELAWARE	25	0.3%	45	IDAHO	138	1.8%	22
DIST. COLUMBIA	9	0.1%	49	KANSAS	88	1.2%	33
FLORIDA	339	4.5%	4	MONTANA	112	1.5%	26
GEORGIA	230	3.0%	12	NEBRASKA	37	0.5%	40
ILLINOIS	332	4.4%	6	NEVADA	29	0.4%	43
INDIANA	236	3.1%	11	NEW MEXICO	62	0.8%	37
IOWA	70	0.9%	36	NORTH DAKOTA	25	0.3%	46
KENTUCKY	146	1.9%	20	OKLAHOMA	109	1.4%	27
LOUISIANA	213	2.8%	14	OREGON	130	1.7%	23
MAINE	44	0.6%	39	SOUTH DAKOTA	34	0.4%	41
MARYLAND	98	1.3%	30	TEXAS	559	7.4%	2
MASSACHUSETTS	118	1.5%	24	UTAH	54	0.7%	38
MICHIGAN	251	3.3%	10	WASHINGTON	223	2.9%	13
MINNESOTA	167	2.2%	18	WYOMING	30	0.4%	42
MISSISSIPPI	95	1.3%	32				
MISSOURI	261	3.4%	9				
NEW HAMPSHIRE	29	0.4%	44				
NEW JERSEY	179	2.4%	16				
NEW YORK	345	4.5%	3				
NORTH CAROLINA	262	3.4%	8				
OHIO	321	4.2%	7				
PENNSYLVANIA	334	4.4%	5				
RHODE ISLAND	15	0.2%	48				
SOUTH CAROLINA	114	1.5%	25				
TENNESSEE	168	2.2%	17				
VERMONT	17	0.2%	47				
VIRGINIA	186	2.4%	15				
WEST VIRGINIA	78	1.0%	34				
WISCONSIN	145	1.9%	21				
EASTERN SUBTOTAL:	5,144	67.6% US		WESTERN SUBTOTAL:	2,461	32.4% US	

U.S. PARTICULATES TOTAL(*): 7,605 Kilotonnes

Source: 1985 NAPAP Emission Inventory Report, EPA-600/7-89-012a, Nov. 1989

(*) Excludes natural sources.

1985 UNITED STATES PART. EMISSIONS BY REGION & STATE



(*) Solid columns: top 10 states.

1985 US CO EMISSIONS & RANK (STATE TOTAL)

(1,000 metric tons)

EASTERN STATES	CO	%	Rk	WESTERN STATES	CO	%	Rk
ALABAMA	1,156	2.1%	18	ARIZONA	636	1.2%	33
ARKANSAS	593	1.1%	36	CALIFORNIA	4,931	8.9%	1
CONNECTICUT	482	0.9%	38	COLORADO	1,033	1.9%	21
DELAWARE	161	0.3%	46	IDAHO	966	1.7%	22
DIST. COLUMBIA	85	0.2%	49	KANSAS	610	1.1%	35
FLORIDA	2,363	4.3%	4	MONTANA	785	1.4%	28
GEORGIA	1,600	2.9%	12	NEBRASKA	365	0.7%	39
ILLINOIS	2,182	3.9%	7	NEVADA	249	0.5%	43
INDIANA	1,838	3.3%	9	NEW MEXICO	682	1.2%	31
IOWA	612	1.1%	34	NORTH DAKOTA	171	0.3%	45
KENTUCKY	926	1.7%	24	OKLAHOMA	897	1.6%	25
LOUISIANA	1,501	2.7%	13	OREGON	958	1.7%	23
MAINE	304	0.5%	42	SOUTH DAKOTA	346	0.6%	40
MARYLAND	712	1.3%	29	TEXAS	4,192	7.6%	2
MASSACHUSETTS	838	1.5%	26	UTAH	676	1.2%	32
MICHIGAN	2,070	3.7%	8	WASHINGTON	1,767	3.2%	10
MINNESOTA	1,193	2.2%	16	WYOMING	339	0.6%	41
MISSISSIPPI	710	1.3%	30				
MISSOURI	1,182	2.1%	17				
NEW HAMPSHIRE	208	0.4%	44				
NEW JERSEY	1,049	1.9%	20				
NEW YORK	2,189	4.0%	6				
NORTH CAROLINA	1,668	3.0%	11				
OHIO	2,592	4.7%	3				
PENNSYLVANIA	2,264	4.1%	5				
RHODE ISLAND	110	0.2%	48				
SOUTH CAROLINA	800	1.4%	27				
TENNESSEE	1,215	2.2%	15				
VERMONT	145	0.3%	47				
VIRGINIA	1,273	2.3%	14				
WEST VIRGINIA	524	0.9%	37				
WISCONSIN	1,134	2.1%	19				

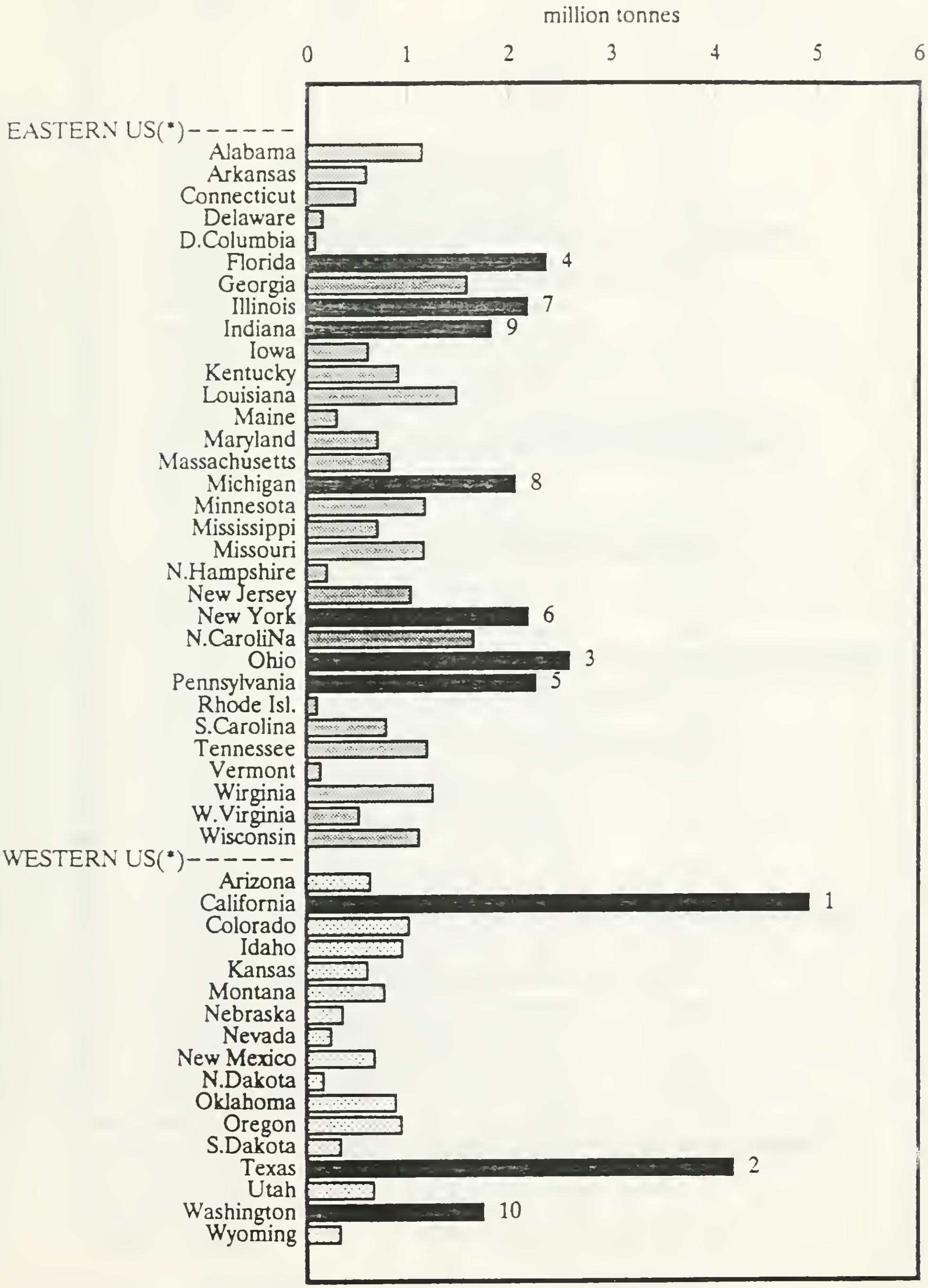
EASTERN SUBTOTAL: 35,677 64.5% US

WESTERN SUBTOTAL: 19,605 35.5% US

UNITED STATES CO TOTAL: 55,282 KILOTONNES

Source: 1985 NAPAP Emission Inventory Report, EPA-600/7-89-012a, Nov. 1989

1985 UNITED STATES CO EMISSIONS BY REGION & STATE



(*) Solid columns: top 10 states.

C.3/SO2/85

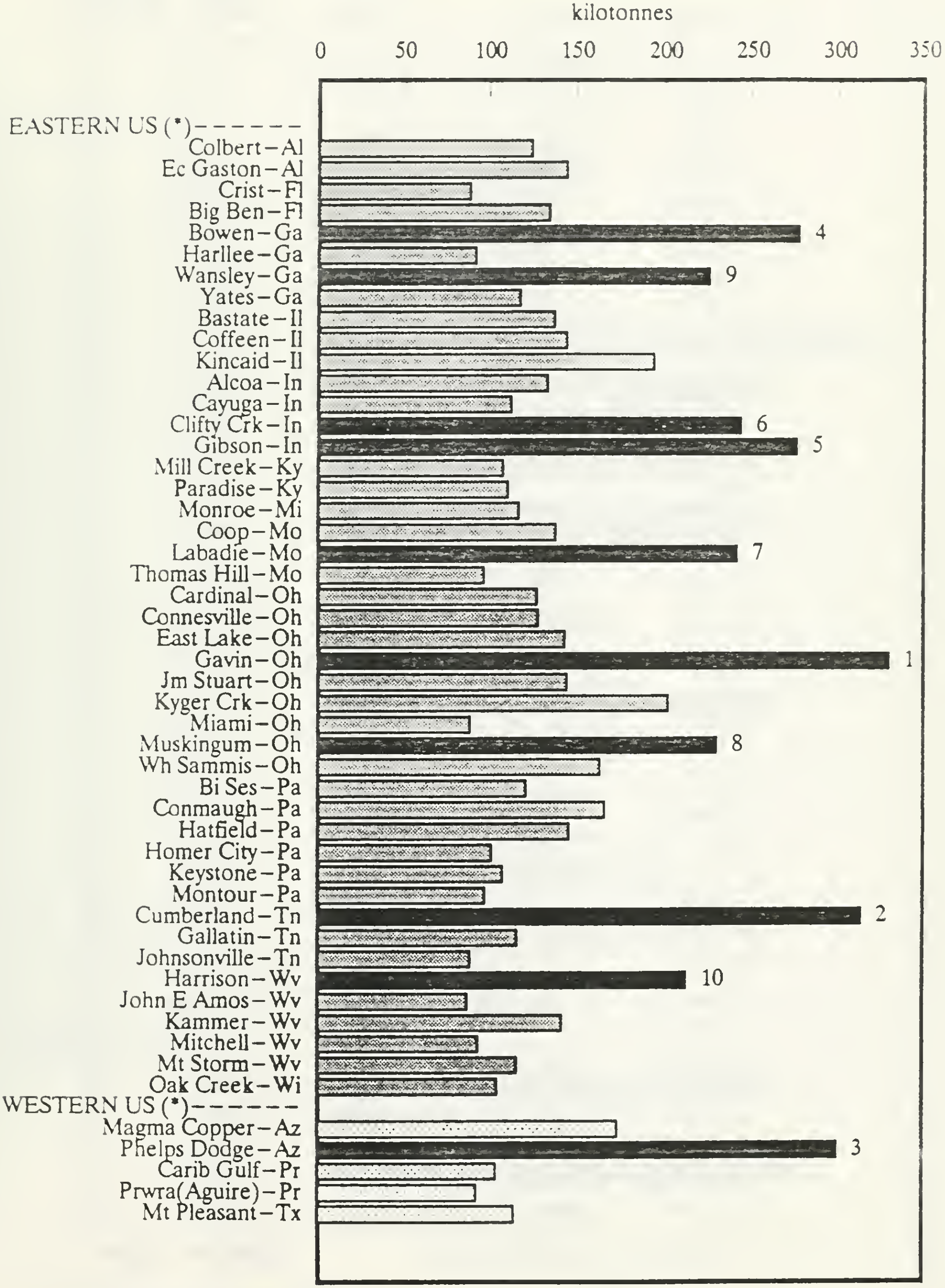
MAJOR SO2 POINT SOURCES IN THE UNITED STATES IN 1985

RANK	STATE	COMPANY	PLANT	SO2 (Tonnes)	Percent US Total
1	OHIO	OHIO POWER CO	GAVIN	329,537	1.6%
2	TENNESSEE	TENNESSEE VALLEY AUT	CUMBERLAND	313,254	1.5%
3	ARIZONA	PHELPS DODGE - DOUGLAS		299,374	1.4%
4	GEORGIA	GEORGIA POWER CO	BOWEN	276,368	1.3%
5	INDIANA	PUBLIC SERV CO	GIBSON	276,027	1.3%
6	INDIANA	IND-KEN ELEC CORP	CLIFTY CREEK	243,683	1.2%
7	MISSOURI	UNION ELECTRIC CO	LABADIE	241,486	1.2%
8	OHIO	OHIO POWER CO	MUSKINGUM	229,915	1.1%
9	GEORGIA	GEORGIA POWER CO	WANSLEY	225,575	1.1%
10	WEST VIRGINIA	MONONGAHELA POWER CO	HARRISON	212,912	1.0%
11	OHIO	OHIO VALLEY ELEC CORP	KYGER CREEK	202,053	1.0%
12	ILLINOIS	COMMONWEALTH EDISON	KINCAID	193,684	0.9%
13	ARIZONA	MAGMA COPPER SMELTER	SAN MANUEL	173,661	0.8%
14	PENNSYLVANIA	PENNSYLVANIA ELEC CO	CONMAUGH JO	166,123	0.8%
15	OHIO	OHIO EDISON CO	W H SAMMIS	163,596	0.8%
16	PENNSYLVANIA	WEST PENN POWER CO	HATFIELD	146,132	0.7%
17	OHIO	DAYTON PWR & LGT CO	J M STUART	144,865	0.7%
18	ILLINOIS	CENTRAL ILL PUBLIC	COFFEEN	144,618	0.7%
19	ALABAMA	ALABAMA POWER CO	E C GASTON	144,468	0.7%
20	OHIO	CLEVELAND ELEC ILLUM	EASTLAKE	143,588	0.7%
21	WEST VIRGINIA	OHIO POWER CO	KAMMER	142,460	0.7%
22	MISSOURI	ASSOCIATED ELECTRIC	COOP	138,178	0.7%
23	ILLINOIS	ILLINOIS POWER CO	BASTATE	137,387	0.7%
24	FLORIDA	TAMPA ELECTRIC CO	BIG BEND	134,729	0.6%
25	INDIANA	ALCOA GENERATING CORP		133,615	0.6%
26	OHIO	COLUMBUS & S OH ELEC	CONESVILLE	128,437	0.6%
27	OHIO	CARDINAL OPERATING CO	CARDINAL	127,482	0.6%
28	ALABAMA	TENNESSEE VALLEY AUT	COLBERT	124,755	0.6%
29	PENNSYLVANIA	PENNSYLVANIA POWER & LGT	BI SES	121,398	0.6%
30	GEORGIA	GEORGIA POWER CO	YATES	117,794	0.6%
31	MICHIGAN	DETROIT EDISON CO	MONROE	117,003	0.6%
32	WEST VIRGINIA	VIRGINIA ELEC & POWER	MT STORM	116,403	0.6%
33	TENNESSEE	TENNESSEE VALLEY AUT	GALLATIN	116,393	0.6%
34	TEXAS	TEXAS UTILITIES	MOUNT PLEASANT	114,947	0.5%
35	INDIANA	PUBLIC SERVICE CO	CAYUGA	112,649	0.5%
36	KENTUCKY	TENNESSEE VALLEY AUT	PARADISE	110,675	0.5%
37	PENNSYLVANIA	PENNSYLVANIA ELEC CO	KEYSTONE JO	107,826	0.5%
38	KENTUCKY	LOUISVILLE GAS & ELEC	MILL CREEK	107,760	0.5%
39	WISCONSIN	WIS ELECTRIC POWER	OAK CREEK	104,838	0.5%
40	PUERTO RICO	CARIBBEAN GULF REFINING CO.		104,246	0.5%
41	PENNSYLVANIA	PENNSYLVANIA ELEC CO	HOMER CTYJO	101,360	0.5%
42	PENNSYLVANIA	PENNSYLVANIA PWR & LGT	MONTOUR	97,377	0.5%
43	MISSOURI	ASSOCIATED ELEC COOP	THOMAS HILL	96,404	0.5%
44	WEST VIRGINIA	OHIO POWER CO	MITCHELL	93,737	0.4%
45	PUERTO RICO	PRWRA-AGUIRRE	BARRIO AGUIRRE	92,654	0.4%
46	GEORGIA	GEORGIA POWER CO	HARLLEE BRANCH	91,828	0.4%
47	TENNESSEE	TENNESSEE VALLEY AUT	JOHNSONVILE	88,996	0.4%
48	OHIO	CINCINNATI GAS ELEC	MIAMI FORT	88,616	0.4%
49	FLORIDA	GULF POWER COMPANY	CRIST	88,387	0.4%
50	WEST VIRGINIA	APPALACHIAN POWER CO	JOHN E AMOS	87,214	0.4%
	TOTAL OF 50 MAJOR SOURCES:			7,617,067	36.3%

SOURCE: EPA-NEDS Point Sources Greater than 1,000 Tons/Year.

MOE/ARB/AQM/EI Aug-90

SO2 EMISSIONS from US TOP 50 SOURCES in 1985



(*) Solid columns: top 10 sources.

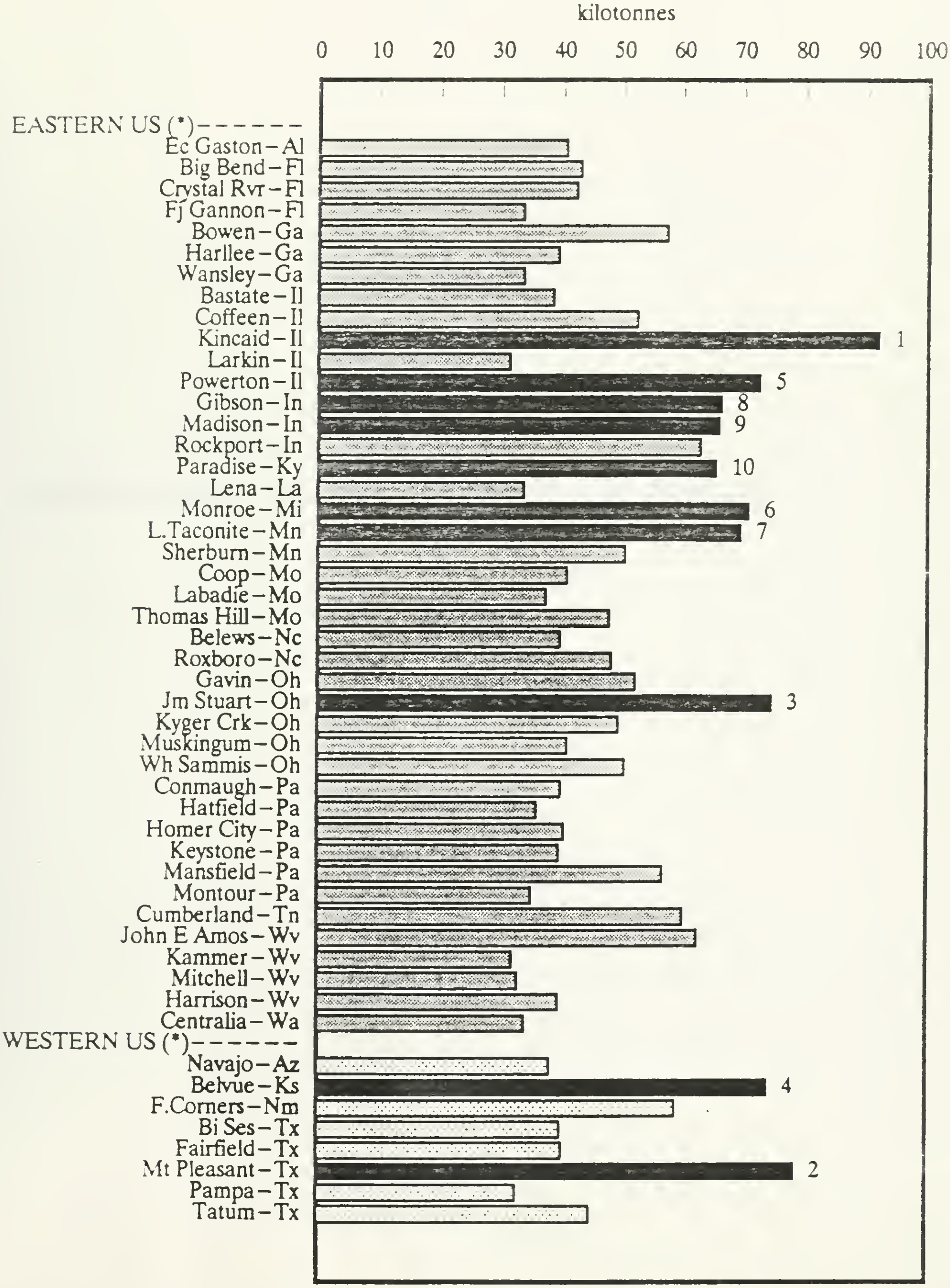
MAJOR NOX POINT SOURCES IN THE UNITED STATES IN 1985

RANK	STATE	COMPANY	PLANT	NOx (Tonnes)	Percent US Total
1	ILLINOIS	COMMONWEALTH EDISON	KINCAID	91,898	0.5%
2	TEXAS	TEXAS UTILITIES	MOUNT PLEASANT	78,500	0.4%
3	OHIO	DAYTON PWR & LGT CO	JM STUART	74,569	0.4%
4	KANSAS	KPL GAS SERVICE (JEC)	BELVUE	74,044	0.4%
5	ILLINOIS	COMMONWEALTH EDISON	POWERTON	72,627	0.4%
6	MICHIGAN	DETROIT EDISON CO	MONROE	70,804	0.4%
7	MINNESOTA	ERIE MINING COMPANY	LAKES TACONITE	69,535	0.4%
8	INDIANA	PUBLIC SERV CO	GIBSON	66,386	0.4%
9	INDIANA	CLIFTY CREEK	MADISON	65,973	0.4%
10	KENTUCKY	TENNESSEE VALLEY AUT	PARADISE	65,470	0.4%
11	INDIANA	IND & MICH ELECTRIC	ROCKPORT ST	62,903	0.3%
12	WEST VIRGINIA	APPALACHIAN POWER CO	JE AMOS	62,618	0.3%
13	TENNESSEE	TENNESSEE VALLEY AUT	CUMBERLAND	60,238	0.3%
14	NEW MEXICO	ARIZONA PUBLIC SERVICE	FOUR CORNER	59,009	0.3%
15	GEORGIA	GEORGIA POWER CO	BOWEN	57,272	0.3%
16	PENNSYLVANIA	PENNSYLVANIA POWER	MANSFLD JO	56,755	0.3%
17	ILLINOIS	CENTRAL ILL PUBLIC SVC	COFFEEN	52,406	0.3%
18	OHIO	OHIO POWER CO	GAVIN	52,122	0.3%
19	OHIO	OHIO EDISON CO	W H SAMMIS	50,419	0.3%
20	MINNESOTA	NORTHERN STATES POWER	SHERBURN	50,392	0.3%
21	OHIO	OHIO VALLEY ELEC CORP	KYGER CREEK	49,341	0.3%
22	NORTH CAROLINA	CAROLINA POWER & LIGHT	ROXBORO	48,120	0.3%
23	MISSOURI	ASSOCIATED ELEC COOP	THOMAS HILL	47,773	0.3%
24	TEXAS	TEXAS UTILITIES	TATUM	44,808	0.2%
25	FLORIDA	TAMPA ELECTRIC CO	BIG BEND	42,914	0.2%
26	FLORIDA	FLORIDA POWER CORP	CRYSTAL RIVER	42,235	0.2%
27	OHIO	OHIO POWER CO	MUSKINGUM RIVER	40,898	0.2%
28	MISSOURI	ASSOCIATED ELECTRIC	COOP ST	40,708	0.2%
29	ALABAMA	ALABAMA POWER CO	E C GASTON	40,498	0.2%
30	PENNSYLVANIA	PENNSYLVANIA ELEC CO	HOMER CITY JO	40,339	0.2%
31	TEXAS	TEXAS UTILITIES	FAIRFIELD	40,201	0.2%
32	PENNSYLVANIA	PENNSYLVANIA PWER&LGHT	BI SES	39,876	0.2%
33	PENNSYLVANIA	PENNSYLVANIA ELEC CO	CONMAUGH JO	39,846	0.2%
34	NORTH CAROLINA	DUKE POWER CO	BELEWS CRK	39,577	0.2%
35	WEST VIRGINIA	MONONGAHELA POWER CO	HARRISON	39,534	0.2%
36	PENNSYLVANIA	PENNSYLVANIA ELEC CO	KEYSTONE JO	39,497	0.2%
37	GEORGIA	GEORGIA POWER CO	HARLLEE BRANCH	39,243	0.2%
38	ILLINOIS	ILLINOIS POWER CO	BASTATE	38,373	0.2%
39	ARIZONA	SALT RIVER PROJECT	NAVAJO	38,102	0.2%
40	MISSOURI	UNION ELECTRIC CO	LABADIE	37,169	0.2%
41	PENNSYLVANIA	WEST PENN POWER CO	HATFIELD	35,767	0.2%
42	PENNSYLVANIA	PENNSYLVANIA PWR&LGHT	MONTOUR	34,956	0.2%
43	WASHINGTON	PACIFIC POWER & LIGH	CENTRALIA	33,876	0.2%
44	LOUISIANA	CENT LA ELEC CO	LENA	33,516	0.2%
45	GEORGIA	GEORGIA POWER CO	WANSLEY	33,498	0.2%
46	FLORIDA	TAMPA ELECTRIC CO	F J GANNON	33,413	0.2%
47	WEST VIRGINIA	OHIO POWER CO	MITCHELL	32,782	0.2%
48	TEXAS	CELANESE CHEM CO	PAMPA	32,623	0.2%
49	WEST VIRGINIA	OHIO POWER CO	KAMMER	31,878	0.2%
50	ILLINOIS	COMMONWEALTH EDISON	LARKIN	31,282	0.2%
	TOTAL OF 50 MAJOR SOURCES:			2,456,580	13.2%

SOURCE: EPA-NEDS Point Sources Greater than 1,000 Tons/Year.

MOE/ARB/AQM/EI Aug-90

NOx EMISSIONS from US TOP 50 SOURCES in 1985



(*) Solid columns: top 10 sources.

SECTION D: NORTH AMERICA EMISSIONS

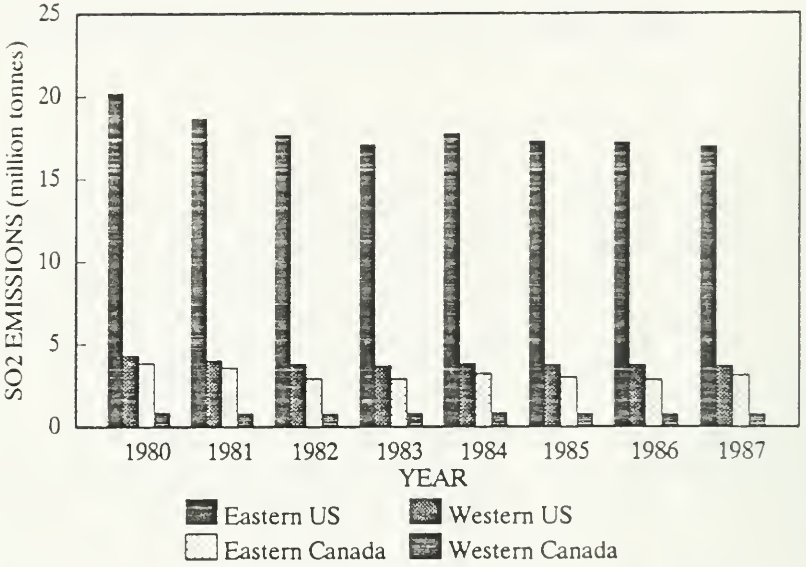
NORTH AMERICA SO2 EMISSION TREND - 1970 TO 1987

COUNTRY	REGION	1970	1975	1978	1980	1981	1982	1983	1984	1985	1986	1987
CANADA	EAST	5.6	4.6	3.6	3.8	3.5	2.9	2.9	3.2	3.0	2.8	3.1
	WEST	1.0	1.0	0.9	0.8	0.8	0.7	0.8	0.8	0.7	0.7	0.7
	TOTAL	6.7	5.6	4.5	4.6	4.3	3.6	3.6	4.0	3.7	3.5	3.8
UNITED STATES	EAST	23.4	21.3	20.3	20.2	18.6	17.6	17.1	17.7	17.3	17.2	16.9
	WEST	5.0	4.5	4.3	4.3	4.0	3.8	3.6	3.8	3.7	3.7	3.7
	TOTAL	28.4	25.8	24.6	24.4	22.6	21.4	20.7	21.5	21.0	20.9	20.6
NORTH AMERICA	EAST	29.1	25.8	23.9	24.0	22.1	20.5	19.9	20.9	20.2	20.0	20.0
	WEST	6.0	5.6	5.2	5.1	4.7	4.5	4.4	4.6	4.5	4.4	4.4
	TOTAL	35.1	31.4	29.1	29.1	26.9	25.0	24.3	25.5	24.7	24.4	24.4

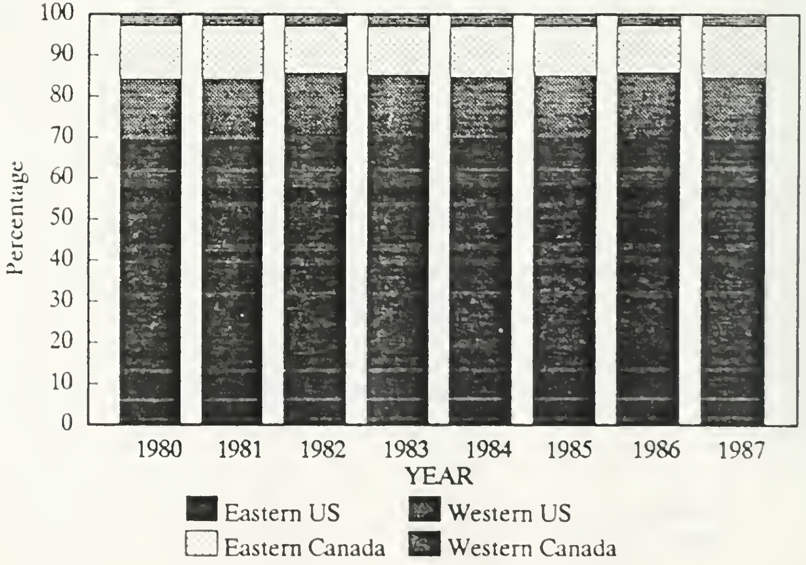
SOURCES: US DATA: "National Air Pollutant Emission Estimates, 1940-1988",
EPA-450/4-90-001, March 1990.

CANADA : 1970 to 1984: C & P trend report, May 87.
1985: EPS 5/AP/3, March 1990.
1986 to 1987: Tentative C&P data.

ONTARIO: 1970 to 1978: C & P trend data.
1980 to 1987: MOE data (86,87: tentative).



NORTH AMERICA SO2 EMISSION TREND
1980 TO 1987 – By Country & Region



NORTH AMERICA SO2 DISTRIBUTION TREND
1980 TO 1987 – By Country & Region

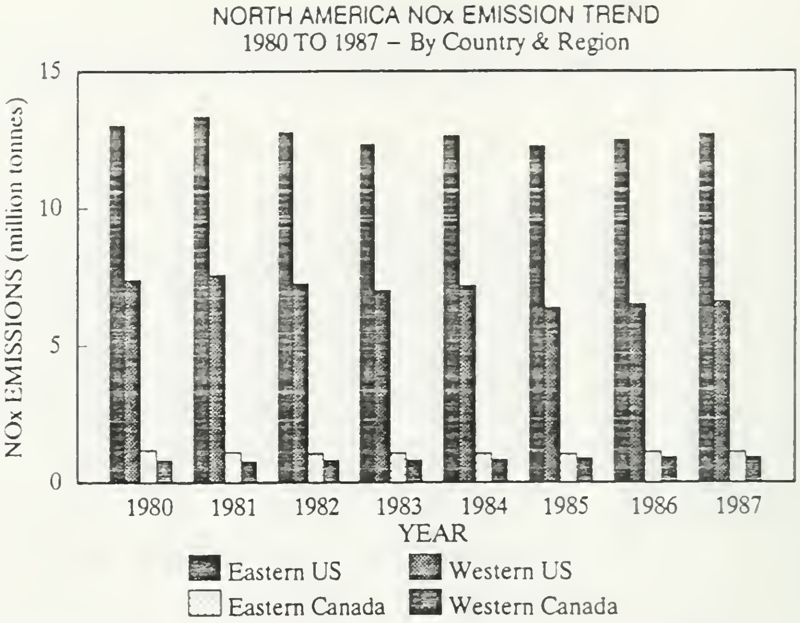
NORTH AMERICA NOx EMISSION TREND - 1970 TO 1987

COUNTRY	REGION	1970	1975	1978	1980	1981	1982	1983	1984	1985	1986	1987
CANADA	EAST	0.9	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.1	1.1
	WEST	0.5	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9
	TOTAL	1.4	1.8	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0
UNITED STATES	EAST	11.8	12.4	13.8	13.0	13.3	12.8	12.3	12.6	12.3	12.5	12.7
	WEST	6.7	7.1	7.9	7.4	7.6	7.2	7.0	7.2	6.4	6.5	6.6
	TOTAL	18.5	19.5	21.7	20.4	20.9	20.0	19.3	19.8	18.6	19.0	19.3
NORTH AMERICA	EAST	12.7	13.5	15.0	14.2	14.4	13.8	13.4	13.7	13.3	13.6	13.8
	WEST	7.2	7.7	8.6	8.2	8.3	8.0	7.8	8.0	7.2	7.4	7.5
	TOTAL	19.9	21.3	23.6	22.4	22.8	21.9	21.2	21.7	20.5	21.0	21.3

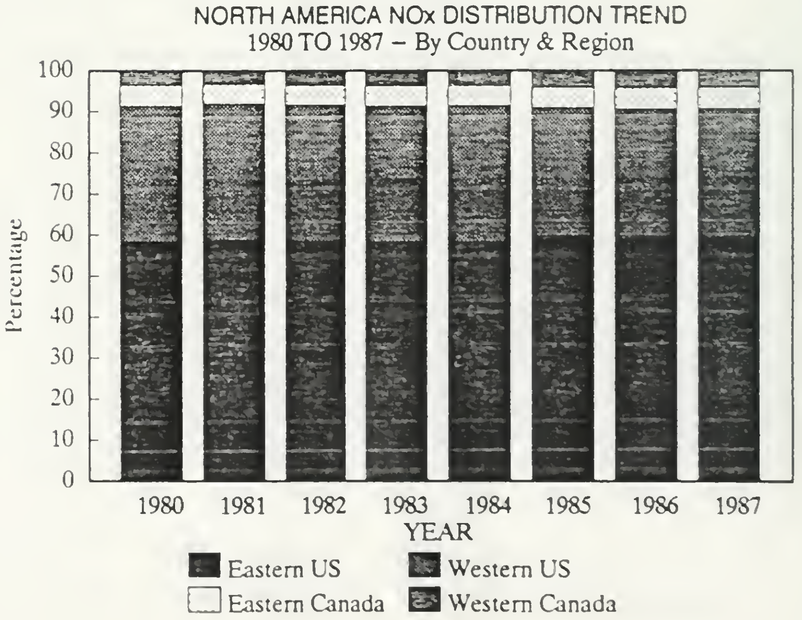
SOURCES: US DATA: "National Air Pollutant Emission Estimates, 1940-1988",
EPA-450/4-90-001, March 1990.

CANADA : 1970 to 1984: C & P trend report, May 87.
1985: EPS 5/AP/3, March 1990.
1986 to 1987: Tentative C&P data.

ONTARIO: 1970 to 1978: C & P trend data.
1980 to 1987: MOE data (86,87: tentative).



NORTH AMERICA NOx EMISSION TREND
1980 TO 1987 – By Country & Region



NORTH AMERICA NOx DISTRIBUTION TREND
1980 TO 1987 – By Country & Region

1985 NORTH AMERICA SO2 EMISSIONS & RANK
(1,000 metric tons)

	EASTERN STATES/PROV.	SO2	%	Rk
C	MANITOBA	469	1.9%	19
A	NEW BRUNSWICK	138	0.6%	38
N	NEWFOUNDLAND	43	0.2%	51
A	NOVA SCOTIA	170	0.7%	32
D	ONTARIO	1,457	5.9%	3
A	P.E.ISLAND	2	0.0%	60
	QUEBEC	693	2.8%	12
U	ALABAMA	657	2.7%	13
N	ARKANSAS	99	0.4%	42
I	CONNECTICUT	79	0.3%	46
T	DELAWARE	107	0.4%	40
E	DIST. COLUMBIA	7	0.0%	57
D	FLORIDA	598	2.4%	16
	GEORGIA	1,009	4.1%	8
S	ILLINOIS	1,262	5.1%	6
T	INDIANA	1,758	7.1%	2
A	IOWA	262	1.1%	26
T	KENTUCKY	797	3.2%	11
E	LOUISIANA	365	1.5%	22
S	MAINE	72	0.3%	48
	MARYLAND	280	1.1%	25
	MASSACHUSETTS	308	1.2%	23
	MICHIGAN	500	2.0%	18
	MINNESOTA	151	0.6%	36
	MISSISSIPPI	158	0.6%	34
	MISSOURI	1,069	4.3%	7
	NEW HAMPSHIRE	77	0.3%	47
	NEW JERSEY	166	0.7%	33
	NEW YORK	604	2.4%	15
	NORTH CAROLINA	439	1.8%	21
	OHIO	2,323	9.4%	1
	PENNSYLVANIA	1,296	5.2%	5
	RHODE ISLAND	8	0.0%	56
	SOUTH CAROLINA	215	0.9%	28
	TENNESSEE	887	3.6%	10
	VERMONT	7	0.0%	58
	VIRGINIA	283	1.1%	24
	WEST VIRGINIA	960	3.9%	9
	WISCONSIN	467	1.9%	20

	WESTERN STATES/PROV.	SO2	%	Rk
C				
A	ALBERTA	539	2.2%	17
N	BRITISH COLUMBIA	105	0.4%	41
A	NW TERR/YUKON	2	0.0%	59
D	SASKATCHEWAN	86	0.3%	43
A				
U	ARIZONA	651	2.6%	14
N	CALIFORNIA	206	0.8%	29
I	COLORADO	84	0.3%	44
T	IDAHO	33	0.1%	55
E	KANSAS	144	0.6%	37
D	MONTANA	83	0.3%	45
	NEBRASKA	58	0.2%	50
S	NEVADA	37	0.1%	54
T	NEW MEXICO	246	1.0%	27
A	NORTH DAKOTA	200	0.8%	30
T	OKLAHOMA	136	0.6%	39
E	OREGON	40	0.2%	52
S	SOUTH DAKOTA	39	0.2%	53
	TEXAS	1,366	5.5%	4
	UTAH	65	0.3%	49
	WASHINGTON	153	0.6%	35
	WYOMING	187	0.8%	31

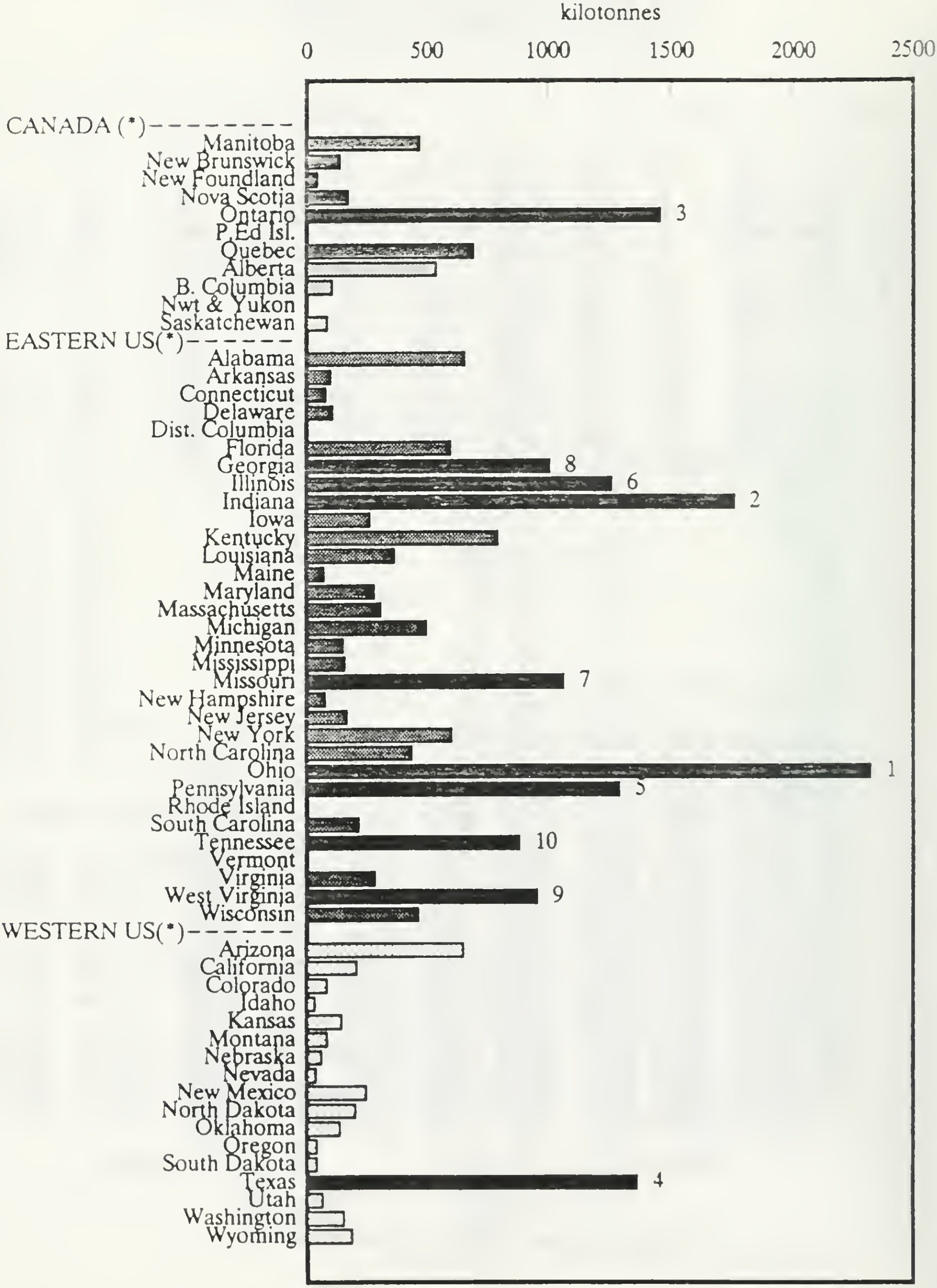
** NORTH AMERICA EMISSION SUMMARY:

EASTERN	- CANADA	2,972	12.0%
	- U.S.	17,270	69.9%
	- N.A.	20,242	81.9%
WESTERN	- CANADA	732	3.0%
	- U.S.	3,728	15.1%
	- N.A.	4,460	18.1%
NATIONAL	- CANADA	3,704	15.0%
	- U.S.	20,998	85.0%
NORTH AMERICA :		24,701	100.0%

NORTH AMERICA SO2 TOTAL : 24,701 KILOTONNES

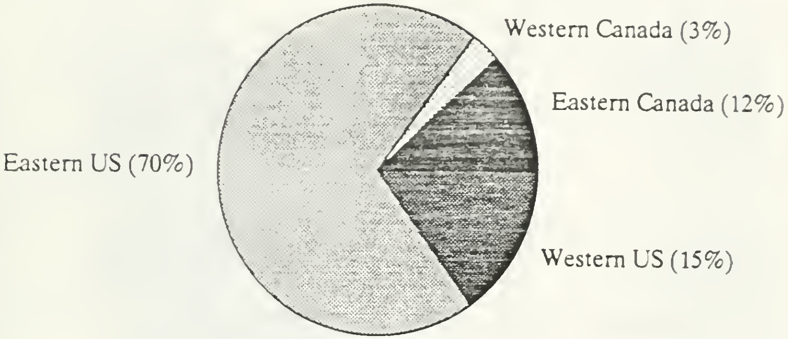
Source: - U.S.: 1985 NAPAP Inventory Report, EPA-600/7-89-012a, Nov. 1989.
- CANADA: C&P EPS 5/AP/3, March 90; - ONTARIO: MOE.

1985 NORTH AMERICA SO2 EMISSIONS BY COUNTRY & STATE

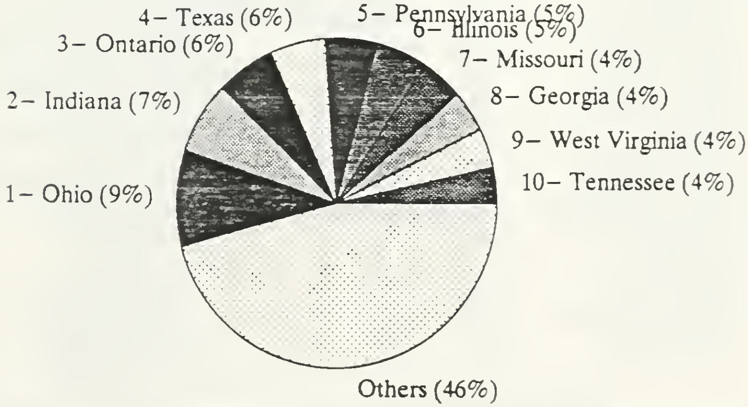


(*) Solid columns: top 10 states/provinces

1985 NORTH AMERICA SO2 EMISSION DISTRIBUTION – BY REGION
Total: 24.7 million tonnes



1985 NORTH AMERICA SO2 EMISSION DISTRIBUTION
Top 10 states/provinces – Total: 24.7 million tonnes



1985 NORTH AMERICA NOx EMISSIONS & RANK
(1,000 metric tons)

	EASTERN STATES/PROV.	SO2	%	Rk		WESTERN STATES/PROV.	SO2	%	Rk
C	MANITOBA	82	0.4%	47	C				
A	NEW BRUNSWICK	46	0.2%	54	A	ALBERTA	440	2.1%	17
N	NEWFOUNDLAND	34	0.2%	55	N	BRITISH COLUMBIA	253	1.2%	29
A	NOVA SCOTIA	74	0.4%	49	A	NW TERR/YUKON	16	0.1%	59
D	ONTARIO	557	2.7%	11	D	SASKATCHEWAN	156	0.8%	40
A	P.E.ISLAND	6	0.0%	60	A				
	QUEBEC	223	1.1%	35					
U	ALABAMA	417	2.0%	18	U	ARIZONA	225	1.1%	34
N	ARKANSAS	216	1.1%	36	N	CALIFORNIA	1,129	5.5%	2
I	CONNECTICUT	116	0.6%	45	I	COLORADO	266	1.3%	26
T	DELAWARE	62	0.3%	51	T	IDAHO	80	0.4%	48
E	DIST. COLUMBIA	18	0.1%	58	E	KANSAS	384	1.9%	20
D	FLORIDA	617	3.0%	8	D	MONTANA	141	0.7%	44
	GEORGIA	533	2.6%	12		NEBRASKA	149	0.7%	43
S	ILLINOIS	879	4.3%	4	S	NEVADA	102	0.5%	46
T	INDIANA	803	3.9%	6	T	NEW MEXICO	257	1.3%	27
A	IOWA	242	1.2%	32	A	NORTH DAKOTA	168	0.8%	39
T	KENTUCKY	472	2.3%	14	T	OKLAHOMA	361	1.8%	21
E	LOUISIANA	692	3.4%	7	E	OREGON	154	0.7%	42
S	MAINE	61	0.3%	52	S	SOUTH DAKOTA	66	0.3%	50
	MARYLAND	256	1.2%	28		TEXAS	2,279	11.1%	1
	MASSACHUSETTS	248	1.2%	31		UTAH	155	0.8%	41
	MICHIGAN	595	2.9%	9		WASHINGTON	249	1.2%	30
	MINNESOTA	322	1.6%	24		WYOMING	203	1.0%	38
	MISSISSIPPI	215	1.0%	37					
	MISSOURI	486	2.4%	13					
	NEW HAMPSHIRE	50	0.2%	53					
	NEW JERSEY	323	1.6%	23					
	NEW YORK	570	2.8%	10					
	NORTH CAROLINA	455	2.2%	16					
	OHIO	922	4.5%	3					
	PENNSYLVANIA	867	4.2%	5					
	RHODE ISLAND	27	0.1%	56					
	SOUTH CAROLINA	234	1.1%	33					
	TENNESSEE	461	2.2%	15					
	VERMONT	23	0.1%	57					
	VIRGINIA	353	1.7%	22					
	WEST VIRGINIA	414	2.0%	19					
	WISCONSIN	316	1.5%	25					

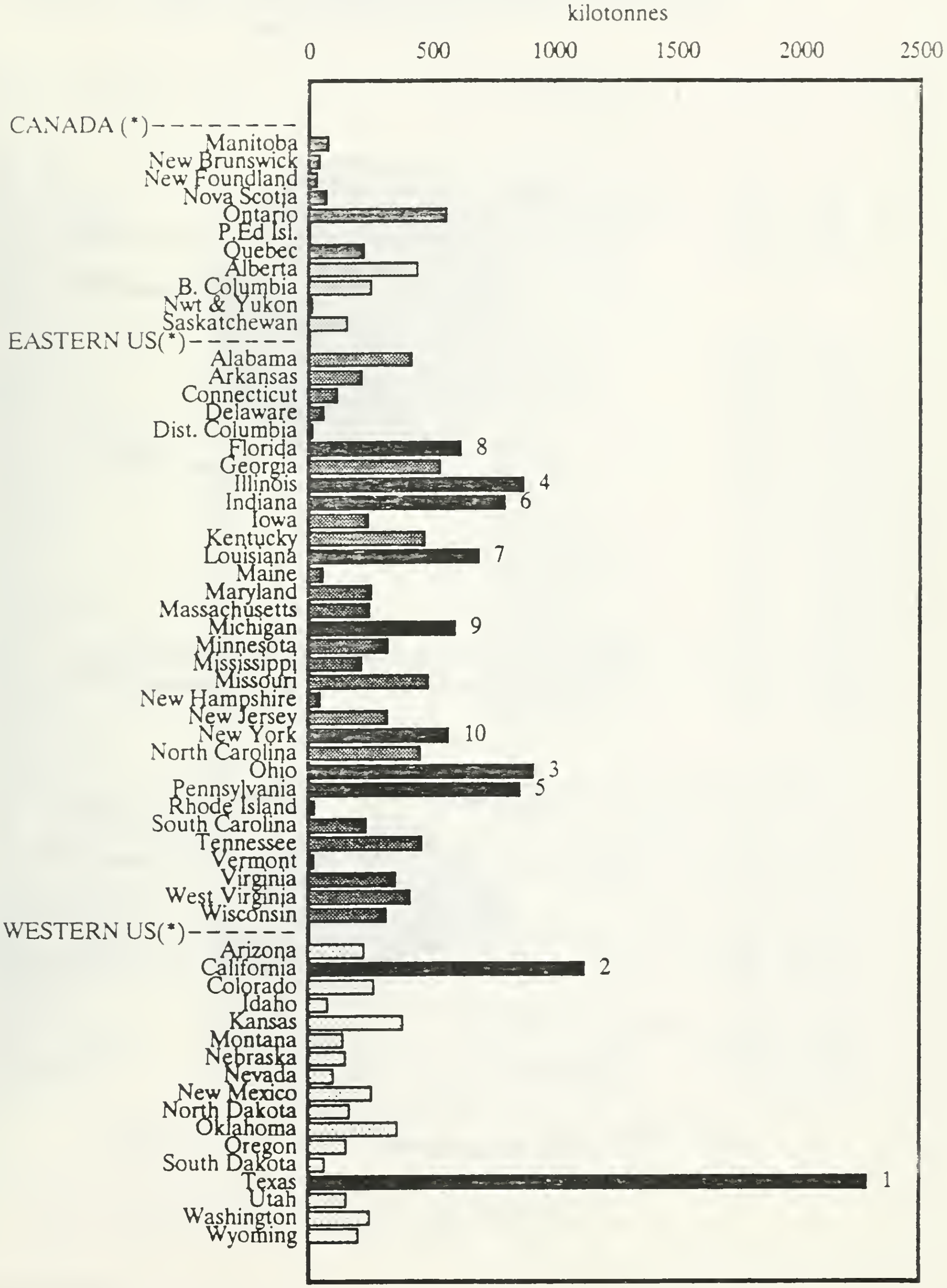
** NORTH AMERICA EMISSION SUMMARY:

EASTERN	- CANADA	1,022	5.0%
	- U.S.	12,267	59.8%
	- N.A.	13,290	64.8%
WESTERN	- CANADA	865	4.2%
	- U.S.	6,367	31.0%
	- N.A.	7,232	35.2%
NATIONAL	- CANADA	1,887	9.2%
	- U.S.	18,635	90.8%
NORTH AMERICA :		20,521	100.0%

NORTH AMERICA NOx TOTAL : 20,521 KILOTONNES

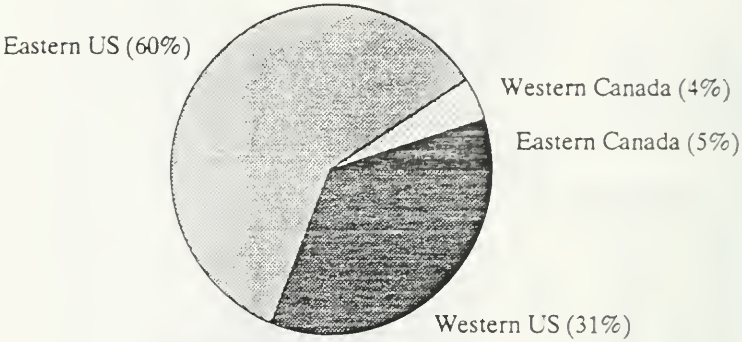
Source: - U.S.: 1985 NAPAP Inventory Report, EPA-600/7-89-012a, Nov. 1989.
- CANADA: C&P EPS 5/AP/3, March 90; - ONTARIO: MOE.

1985 NORTH AMERICA NOx EMISSIONS BY COUNTRY & STATE

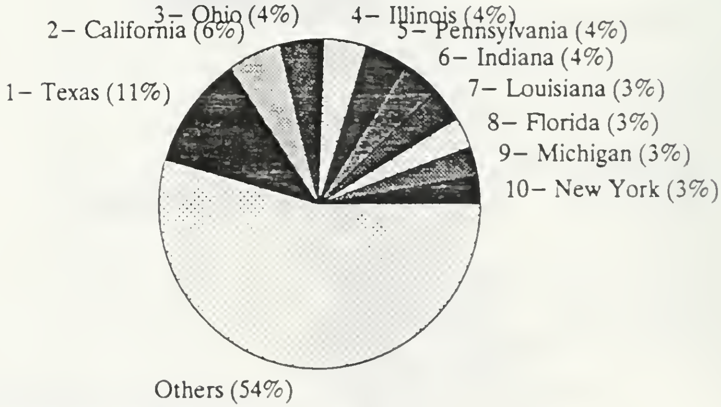


(*) Solid columns: top 10 states/provinces

1985 NORTH AMERICA NOx EMISSION DISTRIBUTION – BY REGION
Total: 20.5 million tonnes



1985 NORTH AMERICA NOx EMISSION DISTRIBUTION
Top 10 states/provinces – Total: 20.5 million tonnes



1985 NORTH AMERICA VOC EMISSIONS & RANK
(1,000 metric tons)

	EASTERN STATES/PROV.	SO2	%	Rk		WESTERN STATES/PROV.	SO2	%	Rk
C	MANITOBA	71	0.3%	51	C				
A	NEW BRUNSWICK	45	0.2%	55	A	ALBERTA	229	1.0%	33
N	NEWFOUNDLAND	36	0.2%	57	N	BRITISH COLUMBIA	295	1.3%	27
A	NOVA SCOTIA	52	0.2%	54	A	NW TERR/YUKON	7	0.0%	60
D	ONTARIO	625	2.9%	9	D	SASKATCHEWAN	84	0.4%	45
A	P.E.ISLAND	11	0.1%	59	A				
	QUEBEC	372	1.7%	23					
U	ALABAMA	451	2.1%	17	U	ARIZONA	218	1.0%	35
N	ARKANSAS	203	0.9%	37	N	CALIFORNIA	1,982	9.1%	2
I	CONNECTICUT	210	1.0%	36	I	COLORADO	273	1.3%	30
T	DELAWARE	79	0.4%	47	T	IDAHO	168	0.8%	39
E	DIST. COLUMBIA	27	0.1%	58	E	KANSAS	221	1.0%	34
D	FLORIDA	723	3.3%	7	D	MONTANA	148	0.7%	42
	GEORGIA	548	2.5%	12		NEBRASKA	115	0.5%	43
S	ILLINOIS	859	3.9%	5	S	NEVADA	74	0.3%	50
T	INDIANA	505	2.3%	15	T	NEW MEXICO	149	0.7%	41
A	IOWA	194	0.9%	38	A	NORTH DAKOTA	56	0.3%	53
T	KENTUCKY	372	1.7%	24	T	OKLAHOMA	311	1.4%	26
E	LOUISIANA	568	2.6%	11	E	OREGON	274	1.3%	29
S	MAINE	95	0.4%	44	S	SOUTH DAKOTA	79	0.4%	48
	MARYLAND	251	1.1%	31		TEXAS	2,113	9.7%	1
	MASSACHUSETTS	378	1.7%	22		UTAH	153	0.7%	40
	MICHIGAN	706	3.2%	8		WASHINGTON	413	1.9%	19
	MINNESOTA	384	1.8%	20		WYOMING	80	0.4%	46
	MISSISSIPPI	245	1.1%	32					
	MISSOURI	448	2.1%	18					
	NEW HAMPSHIRE	74	0.3%	49					
	NEW JERSEY	540	2.5%	13					
	NEW YORK	897	4.1%	4					
	NORTH CAROLINA	607	2.8%	10					
	OHIO	914	4.2%	3					
	PENNSYLVANIA	820	3.8%	6					
	RHODE ISLAND	61	0.3%	52					
	SOUTH CAROLINA	329	1.5%	25					
	TENNESSEE	485	2.2%	16					
	VERMONT	44	0.2%	56					
	VIRGINIA	519	2.4%	14					
	WEST VIRGINIA	279	1.3%	28					
	WISCONSIN	381	1.7%	21					

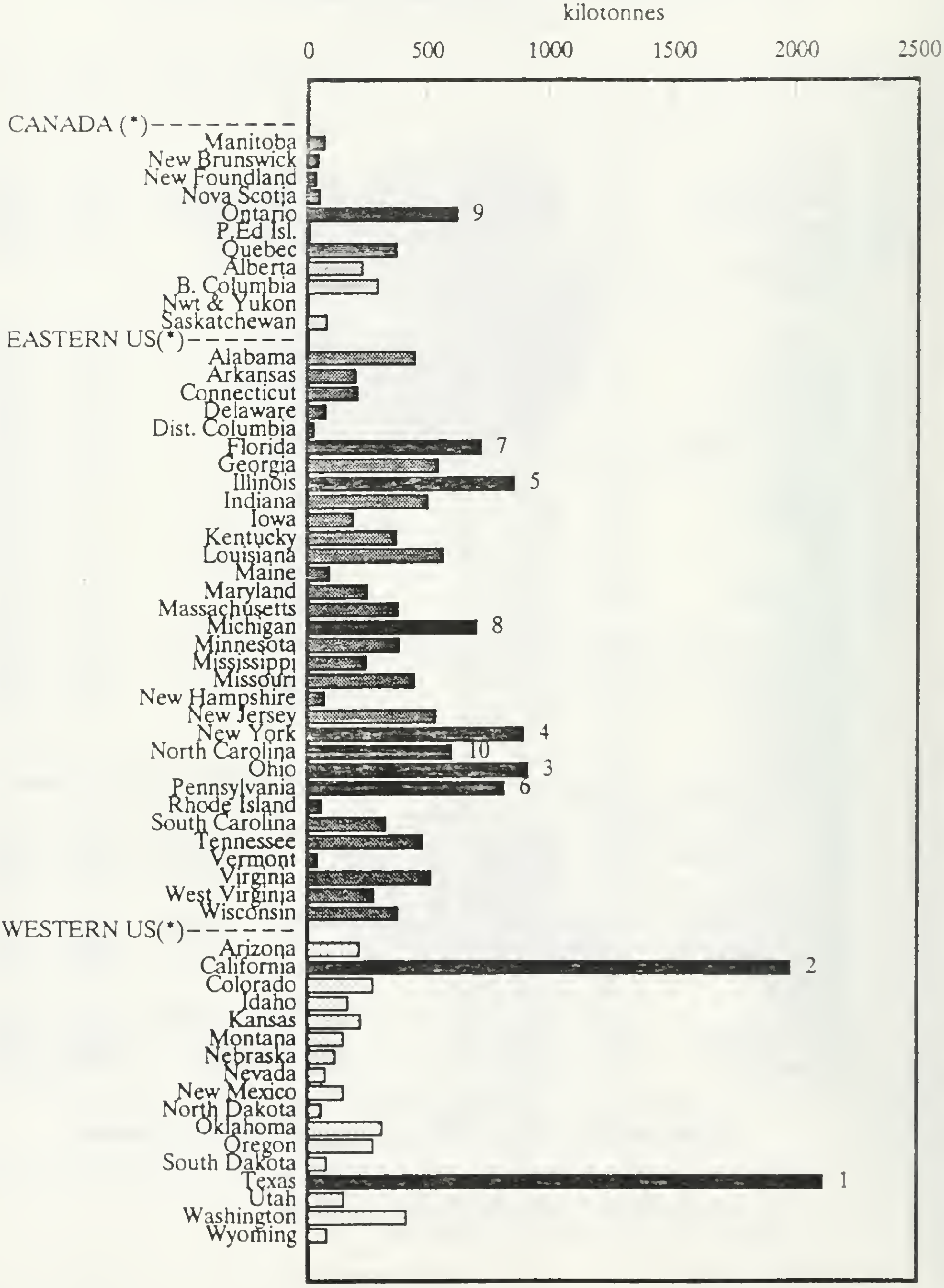
** NORTH AMERICA EMISSION SUMMARY:

EASTERN	- CANADA	1,213	5.5%
	- U.S.	13,197	60.4%
	- N.A.	14,410	65.9%
WESTERN	- CANADA	615	2.8%
	- U.S.	6,827	31.2%
	- N.A.	7,441	34.1%
NATIONAL	- CANADA	1,828	8.4%
	- U.S.	20,024	91.6%
NORTH AMERICA :		21,851	100.0%

NORTH AMERICA VOC TOTAL : 21,851 KILOTONNES

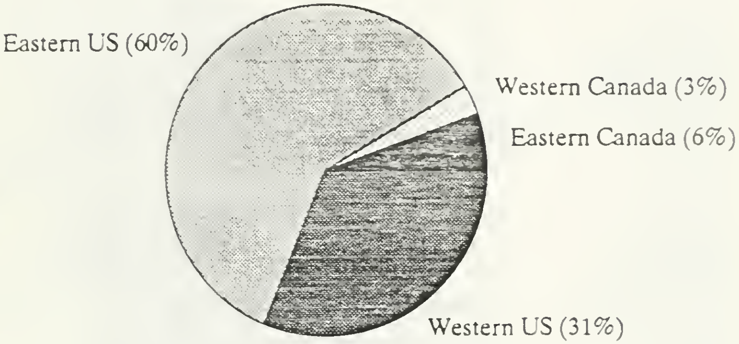
Source: - U.S.: 1985 NAPAP Inventory Report, EPA-600/7-89-012a, Nov. 1989.
- CANADA: C&P EPS 5/AP/3, March 90; - ONTARIO: MOE.

1985 NORTH AMERICA VOC EMISSIONS BY COUNTRY & STATE

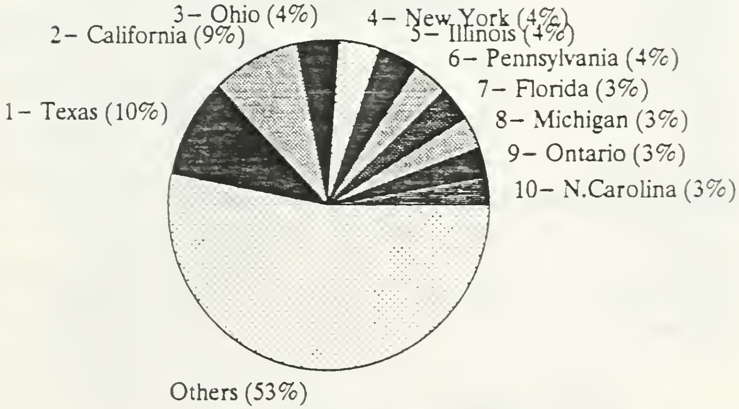


(*) Solid columns: top 10 states/provinces

1985 NORTH AMERICA VOC EMISSION DISTRIBUTION – BY REGION
Total: 21.9 million tonnes



1985 NORTH AMERICA VOC EMISSION DISTRIBUTION
Top 10 states/provinces – Total: 21.9 million tonnes



1985 NORTH AMERICA PARTICULATES EMISSIONS & RANK
(1,000 metric tons)

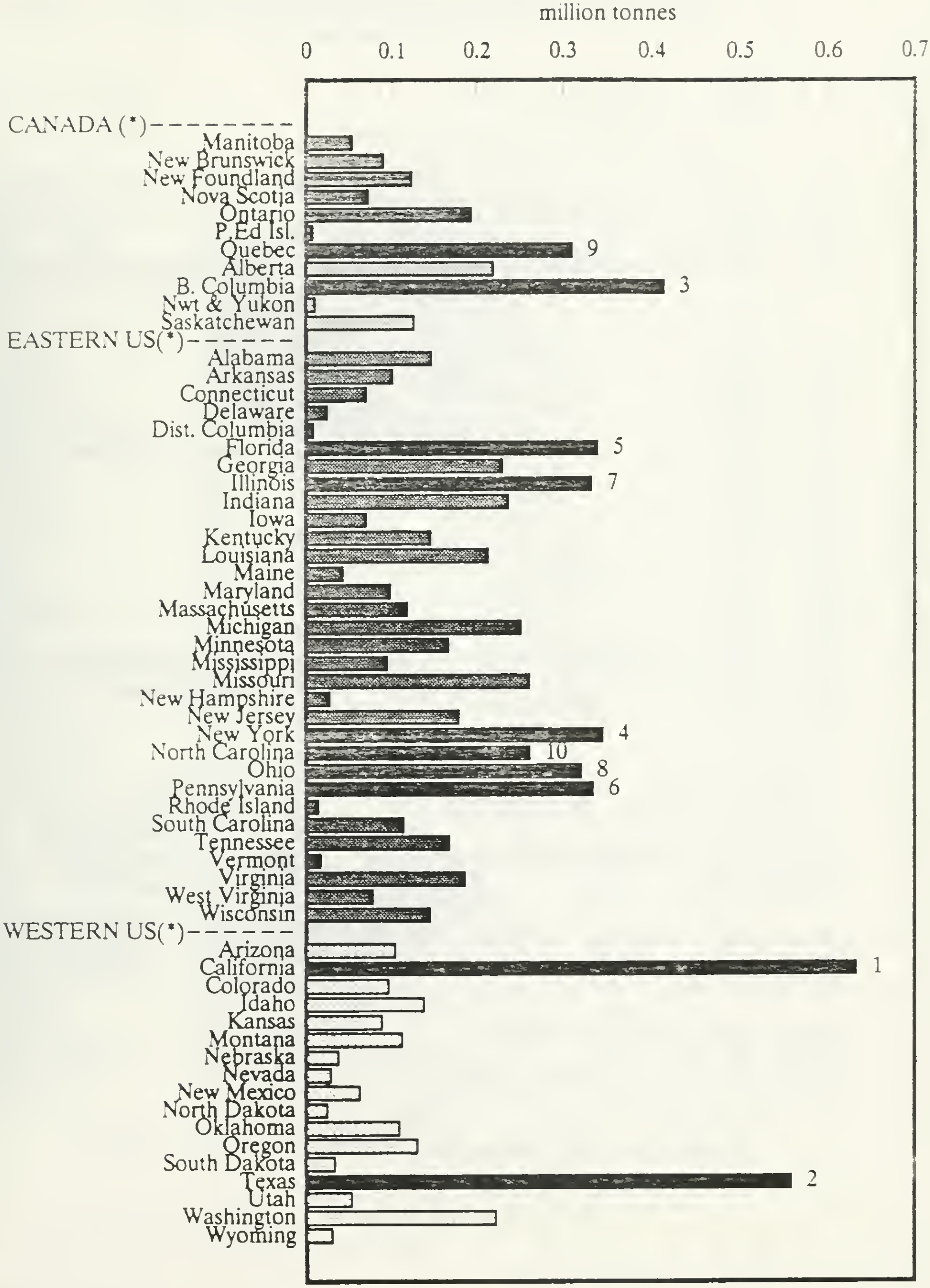
	EASTERN STATES/PROV.	S02	%	Rk		WESTERN STATES/PROV.	S02	%	Rk
C	MANITOBA	54	0.6%	46	C				
A	NEW BRUNSWICK	90	1.0%	39	A	ALBERTA	219	2.4%	16
N	NEWFOUNDLAND	123	1.3%	29	N	BRITISH COLUMBIA	414	4.5%	3
A	NOVA SCOTIA	72	0.8%	42	A	NW TERR/YUKON	11	0.1%	58
D	ONTARIO	193	2.1%	18	D	SASKATCHEWAN	126	1.4%	28
A	P.E.ISLAND	8	0.1%	60	A				
	QUEBEC	310	3.4%	9					
U	ALABAMA	147	1.6%	23	U	ARIZONA	104	1.1%	34
N	ARKANSAS	101	1.1%	35	N	CALIFORNIA	632	6.9%	1
I	CONNECTICUT	70	0.8%	43	I	COLORADO	96	1.0%	37
T	DELAWARE	25	0.3%	54	T	IDAHO	138	1.5%	26
E	DIST. COLUMBIA	9	0.1%	59	E	KANSAS	88	1.0%	40
D	FLORIDA	339	3.7%	5	D	MONTANA	112	1.2%	32
	GEORGIA	230	2.5%	14		NEBRASKA	37	0.4%	49
S	ILLINOIS	332	3.6%	7	S	NEVADA	29	0.3%	52
T	INDIANA	236	2.6%	13	T	NEW MEXICO	62	0.7%	45
A	IOWA	70	0.8%	44	A	NORTH DAKOTA	25	0.3%	55
T	KENTUCKY	146	1.6%	24	T	OKLAHOMA	109	1.2%	33
E	LOUISIANA	213	2.3%	17	E	OREGON	130	1.4%	27
S	MAINE	44	0.5%	48	S	SOUTH DAKOTA	34	0.4%	50
	MARYLAND	98	1.1%	36		TEXAS	559	6.1%	2
	MASSACHUSETTS	118	1.3%	30		UTAH	54	0.6%	47
	MICHIGAN	251	2.7%	12		WASHINGTON	223	2.4%	15
	MINNESOTA	167	1.8%	22		WYOMING	30	0.3%	51
	MISSISSIPPI	95	1.0%	38					
	MISSOURI	261	2.8%	11					
	NEW HAMPSHIRE	29	0.3%	53					
	NEW JERSEY	179	1.9%	20					
	NEW YORK	345	3.7%	4					
	NORTH CAROLINA	262	2.8%	10					
	OHIO	321	3.5%	8					
	PENNSYLVANIA	334	3.6%	6					
	RHODE ISLAND	15	0.2%	57					
	SOUTH CAROLINA	114	1.2%	31					
	TENNESSEE	168	1.8%	21					
	VERMONT	17	0.2%	56					
	VIRGINIA	186	2.0%	19					
	WEST VIRGINIA	78	0.8%	41					
	WISCONSIN	145	1.6%	25					

** NORTH AMERICA EMISSION SUMMARY:

EASTERN	- CANADA	851	9.2%
	- U.S.	5,144	55.8%
	- N.A.	5,995	65.0%
WESTERN	- CANADA	769	8.3%
	- U.S.	2,461	26.7%
	- N.A.	3,230	35.0%
NATIONAL	- CANADA	1,620	17.6%
	- U.S.	7,605	82.4%
NORTH AMERICA :		9,225	100.0%

NORTH AMERICA PART TOTAL : 9,225 KILOTONNES

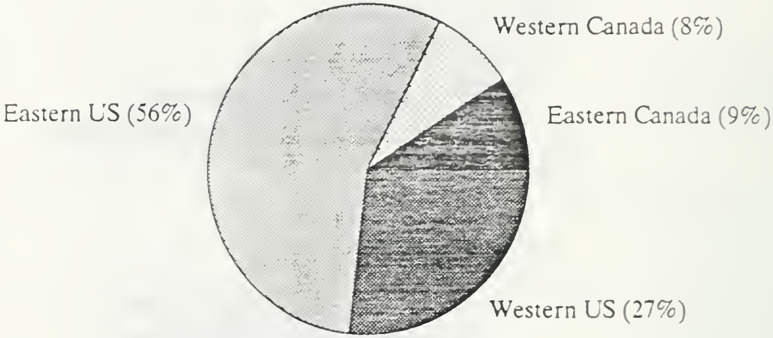
Source: - U.S.: 1985 NAPAP Inventory Report, EPA-600/7-89-012a, Nov. 1989.
- CANADA: C&P EPS S/AP/3, March 90; - ONTARIO: MOE.



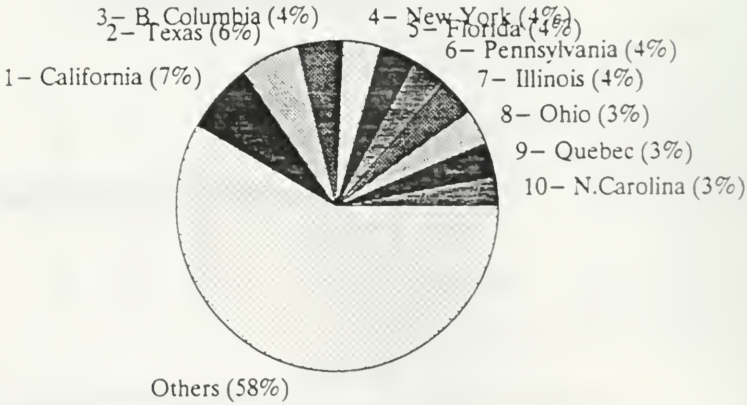
1985 NORTH AMERICA PART. EMISSIONS BY COUNTRY & STATE

(*) Solid columns: top 10 states/provinces

1985 NORTH AMERICA PART EMISSION DISTRIBUTION – BY REGION
Total: 9.2 million tonnes



1985 NORTH AMERICA PART. EMISSION DISTRIBUTION
Top 10 states/provinces – Total: 9.2 million tonnes



1985 NORTH AMERICA CO EMISSIONS & RANK

(1,000 metric tons)

	EASTERN STATES/PROV.	S02	%	Rk		WESTERN STATES/PROV.	S02	%
C	MANITOBA	431	0.7%	44	C			
A	NEW BRUNSWICK	288	0.4%	50	A	ALBERTA	1,277	2.0%
N	NEWFOUNDLAND	198	0.3%	53	N	BRITISH COLUMBIA	2,377	3.6%
A	NOVA SCOTIA	299	0.5%	49	A	NW TERR/YUKON	46	0.1%
D	ONTARIO	2,538	3.9%	4	D	SASKATCHEWAN	644	1.0%
A	P.E.ISLAND	64	0.1%	59	A			
	QUEBEC	1,915	2.9%	11				
U	ALABAMA	1,156	1.8%	22	U	ARIZONA	636	1.0%
N	ARKANSAS	593	0.9%	41	N	CALIFORNIA	4,931	7.5%
I	CONNECTICUT	482	0.7%	43	I	COLORADO	1,033	1.6%
T	DELAWARE	161	0.2%	55	T	IDAHO	966	1.5%
E	DIST. COLUMBIA	85	0.1%	58	E	KANSAS	610	0.9%
D	FLORIDA	2,363	3.6%	6	D	MONTANA	785	1.2%
	GEORGIA	1,600	2.4%	15		NEBRASKA	365	0.6%
S	ILLINOIS	2,182	3.3%	9	S	NEVADA	249	0.4%
T	INDIANA	1,838	2.8%	12	T	NEW MEXICO	682	1.0%
A	IOWA	612	0.9%	39	A	NORTH DAKOTA	171	0.3%
T	KENTUCKY	926	1.4%	28	T	OKLAHOMA	897	1.4%
E	LOUISIANA	1,501	2.3%	16	E	OREGON	958	1.5%
S	MAINE	304	0.5%	48	S	SOUTH DAKOTA	346	0.5%
	MARYLAND	712	1.1%	33		TEXAS	4,192	6.4%
	MASSACHUSETTS	838	1.3%	30		UTAH	676	1.0%
	MICHIGAN	2,070	3.2%	10		WASHINGTON	1,767	2.7%
	MINNESOTA	1,193	1.8%	20		WYOMING	339	0.5%
	MISSISSIPPI	710	1.1%	34				
	MISSOURI	1,182	1.8%	21				
	NEW HAMPSHIRE	208	0.3%	52				
	NEW JERSEY	1,049	1.6%	24				
	NEW YORK	2,189	3.3%	8				
	NORTH CAROLINA	1,668	2.6%	14				
	OHIO	2,592	4.0%	3				
	PENNSYLVANIA	2,264	3.5%	7				
	RHODE ISLAND	110	0.2%	57				
	SOUTH CAROLINA	800	1.2%	31				
	TENNESSEE	1,215	1.9%	19				
	VERMONT	145	0.2%	56				
	VIRGINIA	1,273	1.9%	18				
	WEST VIRGINIA	524	0.8%	42				
	WISCONSIN	1,134	1.7%	23				

** NORTH AMERICA EMISSION SUMMARY:

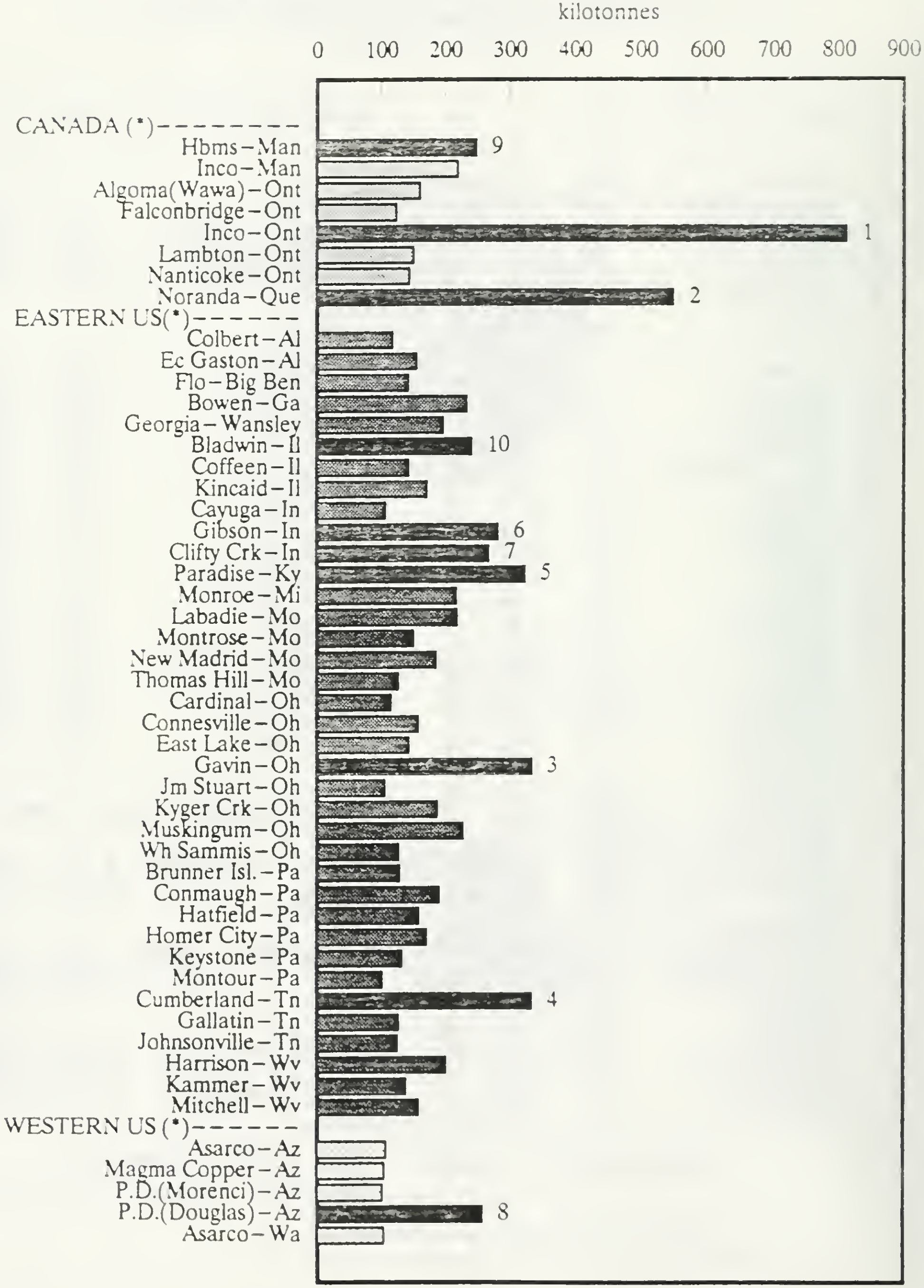
EASTERN	- CANADA	5,732	8.8%
	- U.S.	35,677	54.6%
	- N.A.	41,409	63.4%
WESTERN	- CANADA	4,344	6.6%
	- U.S.	19,605	30.0%
	- N.A.	23,948	36.6%
NATIONAL	- CANADA	10,076	15.4%
	- U.S.	55,282	84.6%
NORTH AMERICA :		65,358	100.0%

NORTH AMERICA CO TOTAL : 65,358 KILOTONNES

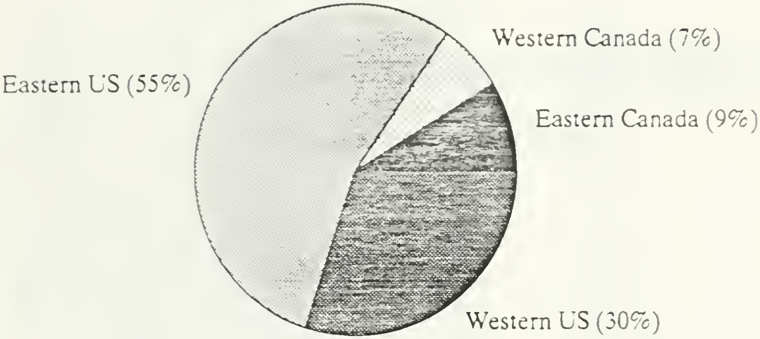
Source: - U.S.: 1985 NAPAP Inventory Report, EPA-600/7-89-012a, Nov. 1989.
- CANADA: C&P EPS 5/AP/3, March 90; - ONTARIO: MOE.

MOE/ARB/AQM/EI- Aug-90

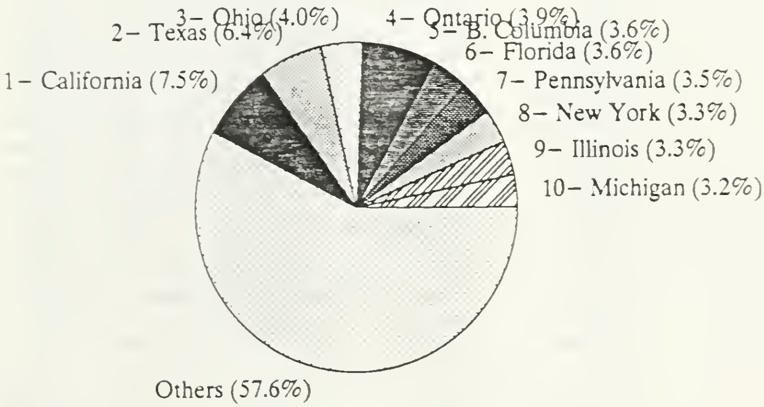
SO2 EMISSIONS from NORTH AMERICA TOP 50 SOURCES in 1980



(*) Solid columns: top 10 sources.



1985 NORTH AMERICA CO EMISSION DISTRIBUTION – BY REGION
Total: 65.4 million tonnes



1985 NORTH AMERICA CO EMISSION DISTRIBUTION
Top 10 states/provinces – Total: 65.4 million tonnes

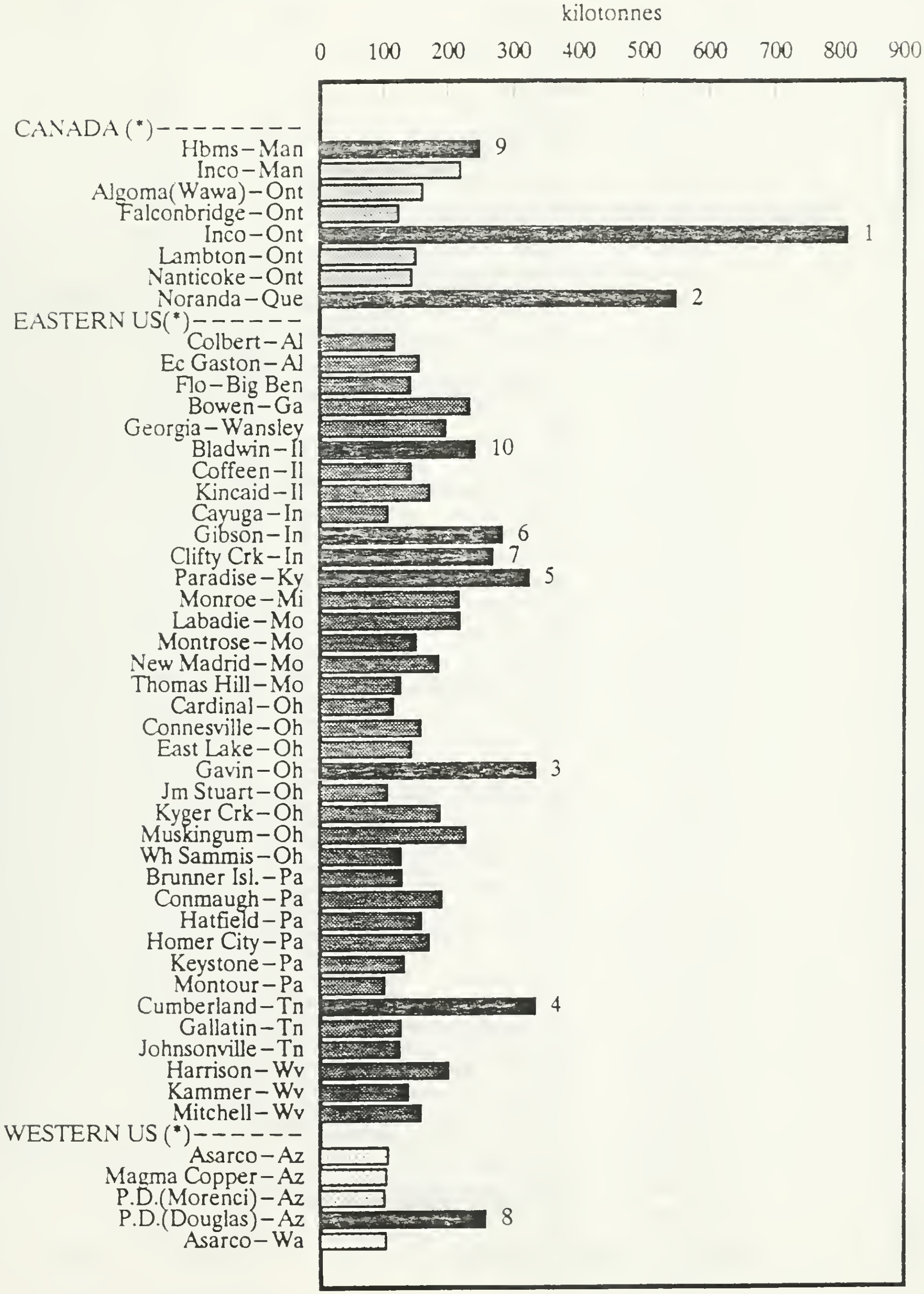
MAJOR SO2 POINT SOURCES IN NORTH AMERICA IN 1980

RANK	STATE	COMPANY	PLANT	SO2 (tonnes)	% of NA Total	Canada Sources
1	ONTARIO	INCO		812,118	3.3%	*
2	QUEBEC	NORANDA		549,000	2.2%	*
3	OHIO	OHIO POWER CO	GAVIN	334,195	1.4%	
4	TENNESSEE	TENNESSEE VALLEY AUTH	CUMBERLAND	333,815	1.4%	
5	KENTUCKY	TENNESSEE VALLEY AUTH	PARADISE	323,089	1.3%	
6	INDIANA	PUBLIC SERV	GIBSON	282,318	1.2%	
7	INDIANA	INDIANA-KETUCKY ELEC	CLIFTY CREEK	268,294	1.1%	
8	ARIZONA	PHELPS DODGE	DOUGLAS	258,059	1.1%	
9	MANITOBA	HUDSON BAY M&S		248,387	1.0%	*
10	ILLINOIS	ILLINOIS POWER CO	BALDWIN	241,338	1.0%	
11	GEORGIA	GEORGIA POWER CO	BOWEN	233,404	1.0%	
12	OHIO	OHIO POWER CO	MUSKINGUM RIVER	227,561	0.9%	
13	MANITOBA	INCO		219,000	0.9%	*
14	MISSOURI	UNION ELECTRIC CO	LABADIE	218,851	0.9%	
15	MICHIGAN	DETROIT EDISON CO	MONROE	217,341	0.9%	
16	W. VIRGINIA	MONONGAHELA POWER CO	HARRISON	200,845	0.8%	
17	GEORGIA	GEORGIA POWER CO	WANSLEY	197,079	0.8%	
18	PENNSYLVANIA	PENNSYLVANIA ELEC CO	CONMAUGH JO	190,863	0.8%	
19	OHIO	OHIO VALLEY ELEC CORP	KYGER CREEK	188,357	0.8%	
20	MISSOURI	ASSOCIATED ELEC COOP	NEW MADRID	185,777	0.8%	
21	ILLINOIS	COMMONWEALTH EDISON CO	KINCAID	171,709	0.7%	
22	PENNSYLVANIA	PENNSYLVANIA ELEC CO	HOMER CTYJO	171,522	0.7%	
23	ONTARIO	ALGOMA (WAWA)		160,583	0.7%	*
24	PENNSYLVANIA	WEST PENN POWER CO	HATFIELD	159,335	0.7%	
25	OHIO	COLUMBUS & S OH ELEC CO	CONESVILLE	158,920	0.7%	
26	W. VIRGINIA	OHIO POWER CO	MITCHELL	158,674	0.6%	
27	ALABAMA	ALABAMA POWER CO	E C GASTON	155,616	0.6%	
28	MISSOURI	KANSAS CITY PWR & LGT	MONTROSE	150,523	0.6%	
29	ONTARIO	ONTARIO HYDRO	LAMBTON	149,774	0.6%	*
30	ONTARIO	ONTARIO HYDRO	NANTICOKE	144,000	0.6%	*
31	OHIO	CLEVELAND ELEC ILLUM CO	EASTLAKE	143,724	0.6%	
32	ILLINOIS	CENTRAL ILL PUBLIC SER C	COFFEEN	142,870	0.6%	
33	FLORIDA	TAMPA ELECTRIC CO	BIG BEND	142,687	0.6%	
34	W. VIRGINIA	OHIO POWER CO	KAMMER	138,812	0.6%	
35	PENNSYLVANIA	PENNSYLVANIA ELEC CO	KEYSTONE JO	132,325	0.5%	
36	PENNSYLVANIA	PENNSYLVANIA PWR & LGT	BRUNNER ISL	129,202	0.5%	
37	TENNESSEE	TENNESSEE VALLEY AUTH	GALLATIN	127,588	0.5%	
38	OHIO	OHIO EDISON CO	W H SAMMIS	127,509	0.5%	
39	MISSOURI	ASSOCIATED ELEC COOP	THOMAS HILL	126,767	0.5%	
40	TENNESSEE	TENNESSEE VALLEY AUTH	JOHNSONVILE	125,696	0.5%	
41	ONTARIO	FALCONBRIDGE		123,333	0.5%	*
42	ALABAMA	TENNESSEE VALLEY AUTH	COLBERT	117,663	0.5%	
43	OHIO	CARDINAL OPERATING CO	CARDINAL	115,210	0.5%	
44	INDIANA	PUBLIC SERV CO	CAYUGA	107,354	0.4%	
45	ARIZONA	ASARCO INC	HAYDEN PLANT	107,023	0.4%	
46	OHIO	DAYTON PWR & LGT CO	J M STUART	106,518	0.4%	
47	ARIZONA	MAGMA COPPER SMELTER	SAN MANUEL	104,028	0.4%	
48	WASHINGTON	ASARCO INC		103,762	0.4%	
49	PENNSYLVANIA	PENNSYLVANIA PWR & LGT	MONTOUR	101,855	0.4%	
50	ARIZONA	PHELPS DODGE CORP	MORENCI	101,196	0.4%	
TOTAL OF 50 MAJOR SOURCES:				9,735,467	39.8%	

SOURCE: MOE, C&P, and NAPAP (1980) Version 5.

MOE/ARB/AQM/EI. Aug-90

SO2 EMISSIONS from NORTH AMERICA TOP 50 SOURCES in 1980



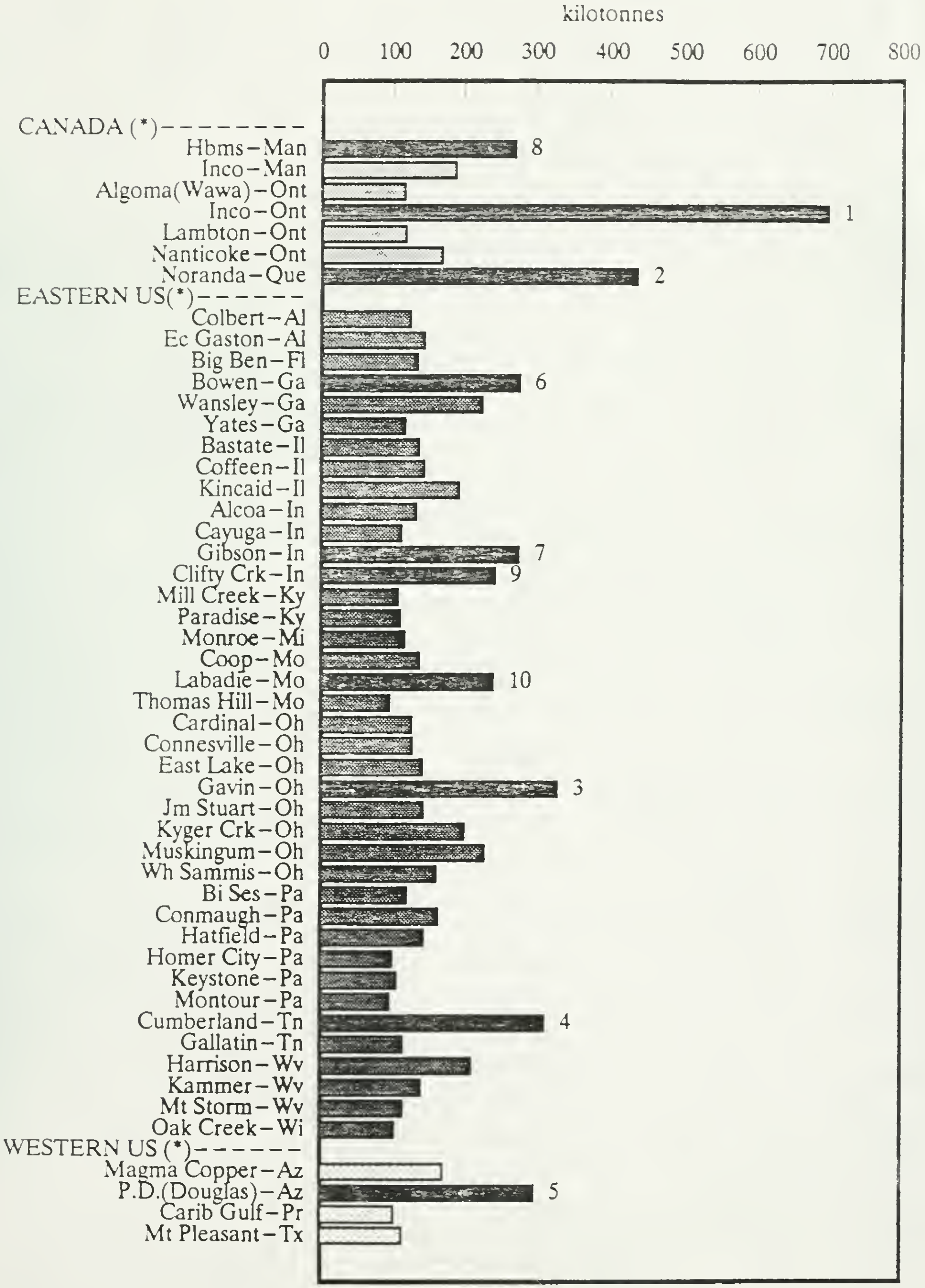
(*) Solid columns: top 10 sources.

MAJOR SO2 POINT SOURCES IN NORTH AMERICA IN 1985

RANK	STATE	COMPANY	PLANT	SO2 (tonnes)	% of NA Total	Canada Sources
1	ONTARIO	INCO		695,000	2.8%	*
2	QUEBEC	NORANDA		436,000	1.8%	*
3	OHIO	OHIO POWER CO	GAVIN	329,537	1.3%	
4	TENNESSEE	TENNESSEE VALLEY AUT	CUMBERLAND	313,254	1.3%	
5	ARIZONA	PHELPS DODGE - DOUGLAS		299,374	1.2%	
6	GEORGIA	GEORGIA POWER CO	BOWEN	276,968	1.1%	
7	INDIANA	PUBLIC SERV CO	GIBSON	276,027	1.1%	
8	MANITOBA	HBMS		270,000	1.1%	*
9	INDIANA	IND-KEN ELEC CORP	CLIFTY CREEK	243,583	1.0%	
10	MISSOURI	UNION ELECTRIC CO	LABADIE	241,486	1.0%	
11	OHIO	OHIO POWER CO	MUSKINGUM	229,915	0.9%	
12	GEORGIA	GEORGIA POWER CO	WANSLEY	225,575	0.9%	
13	WEST VIRGINIA	MONONGAHELA POWER CO	HARRISON	212,912	0.9%	
14	OHIO	OHIO VALLEY ELEC CORP	KYGER CREEK	202,053	0.8%	
15	ILLINOIS	COMMONWEALTH EDISON	KINCAID	193,684	0.8%	
16	MANITOBA	INCO		188,000	0.8%	*
17	ARIZONA	MAGMA COPPER SMELTER	SAN MANUEL	173,561	0.7%	
18	ONTARIO	ONTARIO HYDRO	NANTICOKE	169,000	0.7%	*
19	PENNSYLVANIA	PENNSYLVANIA ELEC CO	CONMAUGH JO	166,123	0.7%	
20	OHIO	OHIO EDISON CO	W H SAMMIS	163,596	0.7%	
21	PENNSYLVANIA	WEST PENN POWER CO	HATFIELD	146,132	0.6%	
22	OHIO	DAYTON PWR & LGT CO	J M STUART	144,865	0.6%	
23	ILLINOIS	CENTRAL ILL PUBLIC	COFFEEN	144,618	0.6%	
24	ALABAMA	ALABAMA POWER CO	E C GASTON	144,468	0.5%	
25	OHIO	CLEVELAND ELEC ILLUM	EASTLAKE	143,588	0.6%	
26	WEST VIRGINIA	OHIO POWER CO	KAMMER	142,460	0.6%	
27	MISSOURI	ASSOCIATED ELECTRIC	COOP	138,178	0.6%	
28	ILLINOIS	ILLINOIS POWER CO	BASTATE	137,387	0.6%	
29	FLORIDA	TAMPA ELECTRIC CO	BIG BEND	134,729	0.5%	
30	INDIANA	ALCOA GENERATING CORP		133,615	0.5%	
31	OHIO	COLUMBUS & S OH ELEC	CONESVILLE	128,437	0.5%	
32	OHIO	CARDINAL OPERATING CO	CARDINAL	127,482	0.5%	
33	ALABAMA	TENNESSEE VALLEY AUT	COLBERT	124,755	0.5%	
34	PENNSYLVANIA	PENNSYLVANIA POWER & LGT	BI SES	121,398	0.5%	
35	ONTARIO	ONTARIO HYDRO	LAMBTON	118,000	0.5%	*
36	GEORGIA	GEORGIA POWER CO	YATES	117,794	0.5%	
37	MICHIGAN	DETROIT EDISON CO	MONROE	117,003	0.5%	
38	WEST VIRGINIA	VIRGINIA ELEC & POWER	MT STORM	116,403	0.5%	
39	TENNESSEE	TENNESSEE VALLEY AUT	GALLATIN	116,393	0.5%	
40	ONTARIO	ALGOMA (WAWA)		115,890	0.5%	*
41	TEXAS	TEXAS UTILITIES	MOUNT PLEASANT	114,947	0.5%	
42	INDIANA	PUBLIC SERVICE CO	CAYUGA	112,649	0.5%	
43	KENTUCKY	TENNESSEE VALLEY AUT	PARADISE	110,675	0.4%	
44	PENNSYLVANIA	PENNSYLVANIA ELEC CO	KEYSTONE JO	107,826	0.4%	
45	KENTUCKY	LOUISVILLE GAS & ELEC	MILL CREEK	107,760	0.4%	
46	WISCONSIN	WIS ELECTRIC POWER	OAK CREEK	104,838	0.4%	
47	PUERTO RICO	CARIBBEAN GULF REFINING		104,246	0.4%	
48	PENNSYLVANIA	PENNSYLVANIA ELEC CO	HOMER CTYJO	101,360	0.4%	
49	PENNSYLVANIA	PENNSYLVANIA PWR & LGT	MONTOUR	97,377	0.4%	
50	MISSOURI	ASSOCIATED ELEC COOP	THOMAS HILL	96,404	0.4%	
TOTAL OF 50 MAJOR SOURCES:				8,977,525	36.3%	

SOURCE: MOE, C&P, and NEDS Point Sources (Greater than 1,000 Tons/Year)

MOE/ARB/AQM/EI Aug-90



SO2 EMISSIONS from NORTH AMERICA TOP 50 SOURCES in 1985

(*) Solid columns: top 10 sources.